Boot Version 10.4 for NIC, iSCSI, FCoE, and RoCE Protocols

User Manual

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Note: References to OCe11100 series products also apply to OCe11100R series products.

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1. Introduction

This manual describes installing, enabling, and configuring boot code for Emulex® network interface card (NIC), Internet Small Computer System Interface (iSCSI), and Fibre Channel over Ethernet (FCoE) adapters. This manual also describes the Emulex boot from SAN implementation and its operation with distinct hardware and operating system requirements.

Boot from SAN is the process of booting a server directly from a disk operating system image located on a storage area network (SAN) by way of Emulex adapters using Emulex boot code. When booting from SAN, the storage device is typically identified by its World Wide Port Name (WWPN) and a logical unit number (LUN). By extending the server system boot basic input/output system (BIOS), boot from SAN functionality is provided by the boot BIOS contained on an Emulex adapter in the server. If properly configured, the adapter then permanently directs the server to boot from a logical unit (disk) on the SAN as if it were a local disk.

Emulex provides the following types of boot code:

- Preboot Execution Environment (PXE) boot for NIC adapters in x86 and x64 systems
- x86 BootBIOS for FCoE adapters in x86 and x64 systems
- iSCSI boot for iSCSI adapters in x86 and x64 systems
- UEFIBoot for NIC, iSCSI, and FCoE adapters in x64 systems

  UEFIBoot provides system boot capability through the use of the UEFI (Unified Extensible Firmware Interface) shell. It also functions on UEFI 2.x-based platforms through the HII (Human Interface Infrastructure).

Note: Emulex drivers support multipath boot configurations. See your storage vendor's documentation for information on configuring multipath booting.

The Emulex boot code and the following utilities provide a variety of capabilities:

- Boot from SAN across different networking protocols and operating systems
- UEFI configuration using the Emulex NIC, FCoE, and iSCSI Configuration utilities
- PXESelect utility
  - Configuring the port and adapter
  - Configuring Emulex Universal Multi-Channel™ (UMC) support and personality options
- FCoE x86 BootBIOS utility
  - Scanning for target devices
  - Configuring boot devices and advanced adapter parameters
- iSCSISelect utility
  - Setting up a basic configuration
  - Configuring and managing iSCSI initiators and targets

The boot code is distributed in the same image used to flash the firmware. Several methods are available for flashing the firmware and boot code image. See the documentation accompanying each utility for additional information on the flash procedure.

Note: Screenshots in this manual are for illustrative purposes only. Your system information can vary.

Abbreviations

ACL	Access Control List
AL_PA	Arbitrated Loop Physical Address
API	application programming interface
ARI	alternative routing-ID interpretation
ARP	Address Resolution Protocol
BBS	BIOS Boot Specification
BIOS	basic input/output system
CHAP	Challenge Handshake Authentication Protocol
CLI	command line interface
CNA	Converged Network Adapter
DCB	Data Center Bridging
DCBX	Data Center Bridging Capabilities Exchange
DHCP	Dynamic Host Control Protocol
DID	device ID
DMA	direct memory access
DNS	Domain Name System or Domain Name Server
EDD	Enhanced Disk Device
EFI	Extensible Firmware Interface
FC	Fibre Channel
FC-AL	Fibre Channel Arbitrated Loop
FCF	Fibre Channel over Ethernet Forwarder
FCoE	Fibre Channel over Ethernet
FL_Port	fabric loop port
FoD	Feature on Demand
FTP	File Transfer Protocol
FUI	FoD Unique Identifier
Gbps	gigabits per second
GPT	GUID partition table
GUI	Graphical User Interface

GUID	Globally Unique Identifier
HBA	host bus adapter
HII	Human Interface Infrastructure
HTTP	Hypertext Transfer Protocol
iBFT	iSCSI boot firmware table
ICMP	Internet Control Message Protocol
I/O	input/output
IOCTL	input/output control
IP	Internet Protocol
IQN	iSCSI qualified name
iSCSI	Internet Small Computer System Interface
ISID	initiator session identifier
iSNS	Internet Storage Name Service
JBOD	just a bunch of disks
KB	Kilobyte (1024 bytes)
LAN	local area network
LDAP	Lightweight Directory Access Protocol
LED	light-emitting diode
LOM	LAN on motherboard
LPVID	logical port VLAN ID
LUN	logical unit number
MAC	Media Access Control
MPIO	multipath I/O
MSI	message signaled interrupt
MSI-X	message signaled interrupt–extended
MTU	maximum transmission unit
NBP	network boot program
NFS	Network File System
NIC	network interface card
NIS	Network Information Service
NPar	NIC partitioning
NTFS	New Technology File System
NVRAM	non-volatile random-access memory
OS	operating system
PCI	Peripheral Component Interconnect (interface)
PCIe	Peripheral Component Interconnect Express
PF	physical function

POST	power-on self-test
PXE	Preboot Execution Environment
QoS	quality of service
RAID	redundant array of independent disks
RDMA	remote direct memory access
RHEL	Red Hat Enterprise Linux
RoCE	RDMA over Converged Ethernet
ROM	read-only memory
RSS	receive-side scaling
SAN	storage area network
SCSI	Small Computer System Interface
SFS	SAN Foundation Software
SLES	SUSE Linux Enterprise Server
SMB	Server Message Block
SR-IOV	single root I/O virtualization
SVID	service VLAN ID
TB	terabyte
TCP	Transmission Control Protocol
TCP/IP	TCP over Internet Protocol
TFTP	Trivial File Transfer Protocol
TOE	TCP Offload Engine
UEFI	Unified Extensible Firmware Interface
UFP	Unified Fabric Port
UMC	Universal Multi-Channel
UNDI	Universal Network Device Interface
USB	Universal Serial Bus
VF	virtual function
VLAN	virtual local area network
VLAN ID	VLAN identifier
VMQ	virtual machine queue
WDS	Windows Deployment Services
WoL	wake on LAN
WWN	World Wide Name
WWNN	World Wide Node Name
WWPN	World Wide Port Name
ZB	zettabyte

2. Configuring PXE Boot for NIC on LPe16202 and OCe11100-series Adapters

Notes

- This section applies to LPe16202 and OCe11100-series adapters. See chapter 3., "Configuring PXE Boot for NIC on OCe14000-series Adapters," on page 41 for information specific to those adapters.
- The LPe16202 adapter may be reported as an OCe15100 adapter by certain applications.

This section describes using and configuring PXE to boot computers using a network interface independent of available data storage devices (such as hard disks) or installed operating systems.

The PXE protocol is a combination of DHCP and TFTP with subtle modifications to both. DHCP locates the appropriate boot server or servers, and TFTP downloads the initial bootstrap program and additional files.

Network booting enables you to perform the following tasks:

- Boot diskless systems such as thin clients and dedicated systems.
- Deploy software and operating systems for your systems.
- Automate system maintenance, such as backups.
- Automate system checking, such as virus scanning.
- Ensure a system is secure.

Pre-OS

PXE can be used in a "pre-OS" environment. Pre-OS is the process of loading a small operating environment to perform a client management task before loading the final operating system from the local hard drive. For example, with a pre-OS you can scan the hard drive for viruses. This guarantees that the client is not infected before it starts. Another example is the WDS using this feature to install operating systems on local disks or boot from SAN disks.

PXE Boot Process

After PXE boot is enabled in the system UEFI and BIOS, the PXE client can boot up and start up the PXE boot ROM. This is the boot code physically located on the NIC adapter.

Figure 2-1, PXE Boot Process, on page 25 shows the boot process.

Note: To enable or disable PXE boot, it must be enabled or disabled in the system UEFI and BIOS; see the documentation that accompanied the server for more information.

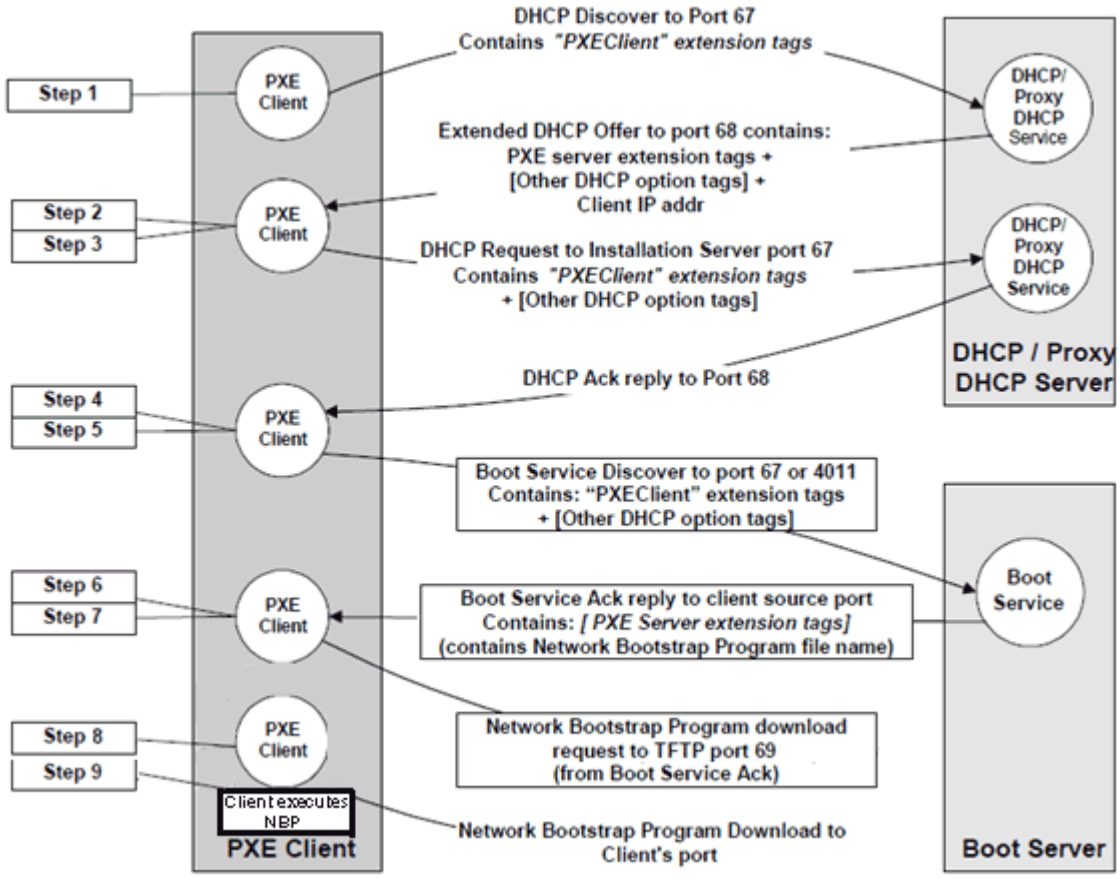

Figure 2-1 PXE Boot Process

1. The PXE boot ROM sends a DHCP request extended with PXE specific options (step 1 in the figure).
2. The DHCP responses contain the DHCP options (DHCPOFFERs) that include the NBP filename and boot server lists (steps 2 through 5).
3. The PXE client attempts to download the specified NBP over TFTP from one of the specified boot servers (steps 6 and 7).
4. The PXE client executes the downloaded NBP (steps 8 and 9).

Note: If any of these steps fail, the boot process typically continues using the next available device in the boot sequence, depending on the system configuration and boot order.

Remotely Installing with PXE for Windows Server 2008, 2008 R2, 2012, and 2012 R2

For remote installation with PXE, a network driver for the Emulex adapter must be part of the client's installation image on the server. The current versions of Windows Server 2008 and Windows Server 2008 R2 do not include network drivers for the Emulex adapter; however, Windows Server 2012 and 2012 R2 include the network driver for the Emulex adapter.

To add the image and installation using the driver with the Remote Installation Service Setup, select:

Start Menu > Programs > Administrative Tools > Remote Installation Services Setup

In addition to the network driver for the Emulex adapter, you must configure the following services to use PXE for remote installations:

- DHCP server
- Remote Installation Services
- Windows Deployment Services

Microsoft provides extensive documentation on deploying its operating systems for remote installations, and different setups may be required depending on your individual implementation. Microsoft provides step-by-step guides for its Windows Deployment Services for configuring the server, adding images, and installing an operating system. It also includes instructions for more advanced tasks like creating multicast transmissions, creating custom images, and performing an unattended installation.

For detailed information on deploying and managing remote installations on Windows Server 2008, Windows Server 2008 R2, Windows Server 2012, and Windows Server 2012 R2, see the Microsoft website and visit Microsoft TechNet. Search on the bulleted terms above to access Microsoft's wide-ranging documentation on these subjects.

Remotely Installing with PXE for Linux and Citrix Servers

Linux allows for PXE installation over a network using the NFS, TFTP, or HTTP protocols. If the system to be installed contains an Emulex NIC or adapter with PXE Boot support, it can be configured to boot from files on another networked system rather than local media.

The Linux distributions provide extensive documentation on deploying and managing remote installations of the Linux operating system using PXE. See the distribution's documentation for instructions on deploying a PXE installation over the network.

For remote installation with PXE, a network driver for the Emulex adapter must be part of the client's installation image on the server. The current Linux distribution may or may not include network drivers for Emulex adapters. If it does, the driver may need to

be added to the operating system's installation image, or added during installation. See the distribution's documentation for instructions on adding drivers during installation.

Using the PXESelect Utility

This section describes how to configure PXE boot options using the PXESelect utility.

Note: For Dell adapters, see appendix G., "Configuring PXE Boot for NIC on Dell OCe14000-based Systems," on page 290 for information on using the PXESelect utility.

Navigating the PXESelect Utility

Use the following methods to navigate the PXESelect utility:

- Press the up and down arrows on the keyboard to move through and select menu options or configuration fields. If multiple adapters are listed, use the up and down arrows to scroll to the additional adapters.
- Press **<Tab>** to move to the next field or to select a row in a configuration screen. Use **<Shift> <Tab>** to move to the previous field.
- Press **<Enter>** to accept a selection, select a menu option, or change a configuration default.
- Press **<Esc>** to return to the previous menu or page, cancel a selection or dialog box, or exit the utility.

Running the PXESelect Utility

To run the PXESelect utility, start or restart the computer. When prompted, hold down **<Ctrl>** and press **<P>**. If you are running the PXESelect utility with multiple adapters, all of the adapters are displayed when you start the utility. For example:

```
Press <Ctrl><P> for PXESelect(TM)Utility

Controller#0 Port#0 Base 0xFCE60000 at Bus:05 Dev:00 Fun:00
Controller#0 Port#1 Base 0xFCEA0000 at Bus:05 Dev:00 Fun:01
Controller#1 Port#0 Base 0xFC920000 at Bus:01 Dev:00 Fun:00
Controller#1 Port#1 Base 0xFC960000 at Bus:01 Dev:00 Fun:01
- Initializing ...Done.
```

The PXE Configuration menu appears after the boot BIOS initializes to begin the PXE configuration.

Note: A UEFI-capable system typically does not display the prompt for running the PXESelect utility unless it is configured for legacy booting. See your system configuration manual for information on performing a legacy boot. All configuration that can be performed in the PXESelect utility can instead be performed in the UEFI configuration utility. See chapter 11., "Configuring UEFI for Ethernet," on page 127 for more information.

Setting Up a PXE Bootable Network

After the PXE boot BIOS is initialized, you can use the PXESelect utility to set up a PXE bootable network by configuring the adapters.

To configure adapters for PXE boot:

1. At the Controller Selection Menu screen (Figure 2-2 on page 28), use the **<Tab>** key to select the adapter you want to configure and press **<Enter>**.

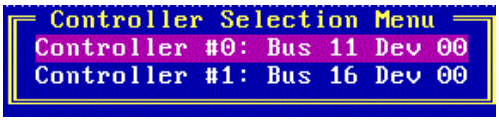

Figure 2-2 Controller Selection Menu Screen

Note: The Controller Selection Menu screen is displayed only if two or more adapters are connected.

The Controller Configuration screen (Figure 2-3 on page 28) is displayed.

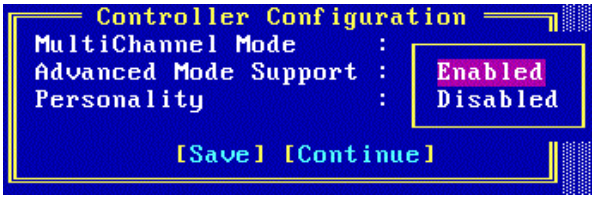

Figure 2-3 Controller Configuration Screen

Depending on the adapter, the following options are available:

- MultiChannel Mode – allows you to access up to eight virtual network interfaces. For additional information on MultiChannel Mode, see "Configuring Emulex Universal Multi-Channel" on page 32.

  Note: If you are using an IBM adapter, see "Configuring Multi-Channel for IBM Adapters" on page 35 for additional information on Multichannel Mode.

- Advanced Mode Support – enables you to run Advanced Mode–aware drivers. For additional information on configuring Advanced Mode, see "Advanced Mode Support" on page 38.
- Personality – allows you to select the protocols that can be configured on an adapter. For additional information on adapter personality, see "Personality Option" on page 39.

2. After you have set the options in the Controller Configuration screen, select **Save** and press **<Enter>**.
3. To proceed, select **Continue** and press **<Enter>**.

   The Port Selection Menu screen (Figure 2-4 on page 29) is displayed.

4. Select the port you want to configure and press **<Enter>**.

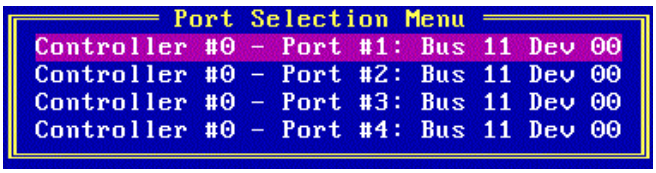
Port Selection Menu
Controller #0 - Port #1: Bus 11 Dev 00
Controller #0 - Port #2: Bus 11 Dev 00
Controller #0 - Port #3: Bus 11 Dev 00
Controller #0 - Port #4: Bus 11 Dev 00

Figure 2-4 Port Selection Menu Screen

Note: The Port Selection Menu screen is displayed if two or more ports are connected.

Depending on the installed adapter and the MultiChannel Mode setting, proceed to the following sections:

- If MultiChannel Mode is disabled, or it is not supported, see "Configuring Ports If UMC is Disabled or Not Supported" on page 29 for additional configuration information.
- If MultiChannel Mode is enabled, see "Configuring Emulex Universal Multi-Channel" on page 32 for additional configuration information.
- If MultiChannel Mode is enabled and you are using IBM adapters, see "Configuring Multi-Channel for IBM Adapters" on page 35 for additional configuration information.

Configuring Ports If UMC is Disabled or Not Supported

Note: If UMC is enabled, see "Configuring Emulex Universal Multi-Channel" on page 32. If you are using an IBM adapter, see "Configuring Multi-Channel for IBM Adapters" on page 35.

If UMC is disabled, or if it is not supported, the Port Configuration screen (Figure 2-5 on page 29) appears after you select a port in the Port Selection Menu screen (Figure 2-4 on page 29).

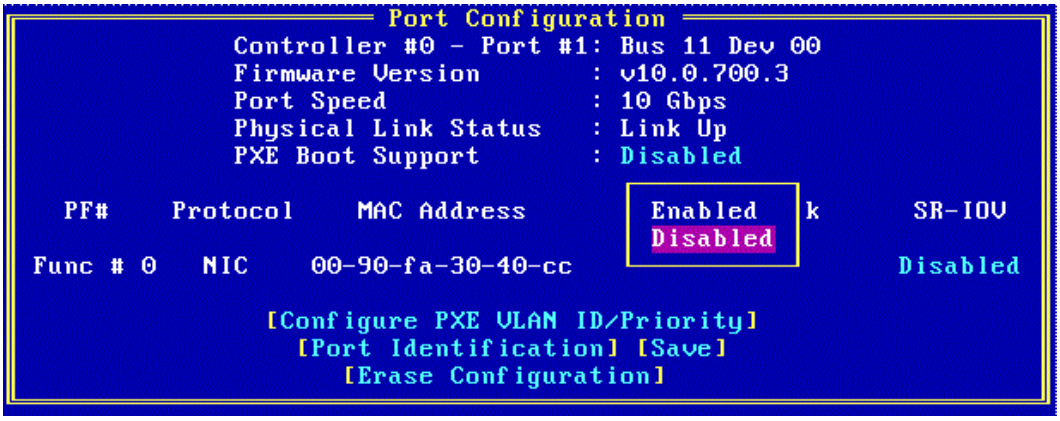
Port Configuration
Controller #0 - Port #1: Bus 11 Dev 00
Firmware Version : v10.0.700.3
Port Speed : 10 Gbps
Physical Link Status : Link Up
PXE Boot Support : Disabled
PF# Protocol MAC Address Enabled k SR-IOV
Disabled
Func # 0 NIC 00-90-fa-30-40-cc Disabled
[Configure PXE VLAN ID/Priority]
[Port Identification] [Save]
[Erase Configuration]

Figure 2-5 Port Configuration Screen

Note: Logical Link Status is displayed as "N/A" for storage functions.

The Port Configuration screen enables you to perform the following tasks:

- Configure PXE boot support
- Configure SR-IOV
- Configure PXE VLAN ID and Priority
- Identify ports
- Erase the port and adapter configuration

Configuring PXE Boot Support

To configure PXE boot support:

1. On the configuration screen, use the **<Tab>** key to select PXE Boot Support. A pop-up menu is displayed.
2. Select **Enabled** or **Disabled** and press **<Enter>**.
3. Select **Save** and press **<Enter>**.

Note: During system startup, PXE contacts the DHCP server for an IP address to boot from the network.

Configuring SR-IOV

If the system BIOS supports SR-IOV, you can enable it on the adapter. SR-IOV support can be enabled only if UMC is disabled or not supported. For more information on SR-IOV configuration, see the appropriate Emulex driver manual.

To configure SR-IOV:

1. On the configuration screen, use the **<Tab>** key to select SR-IOV. A pop-up menu is displayed.
2. Select **Enabled** or **Disabled** and press **<Enter>**.
3. Select **Save** and press **<Enter>**.

Configuring the PXE VLAN ID and Priority

To configure a PXE VLAN ID and set the priority level:

1. On the configuration screen, select **Configure PXE VLAN ID/Priority** and press **<Enter>**. The Configure PXE VLAN ID/Priority menu (Figure 2-6 on page 30) is displayed.

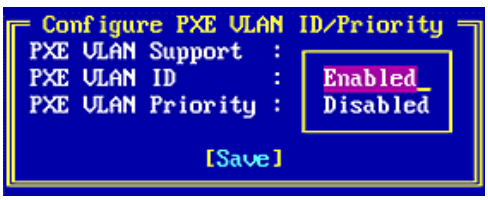

Figure 2-6 Configure PXE VLAN ID/Priority Menu

2. Use the **<Tab>** key to select PXE VLAN Support. A pop-up menu is displayed.
   a. For PXE VLAN Support, select **Enabled** and press **<Enter>**.
   b. For the PXE VLAN ID, select a number from 0 to 4094 and press **<Enter>**.

c. For the PXE VLAN Priority level, select a number from 0 to 7 and press **<Enter>**. This unique value assigns a priority to outbound packets containing a specified VLAN ID. Valid values range from 0 to 7, with 0 the highest priority level.

3. Select **Save** and press **<Enter>**.

After you exit the PXESelect utility, the system will reboot for the configuration to take effect.

Physically Identifying the Port

To physically determine which port you are configuring by causing the link and activity LEDs of that port to blink:

1. On the configuration screen, select **Port Identification** and press **<Enter>**. The Port Identification screen (Figure 2-7 on page 31) is displayed.

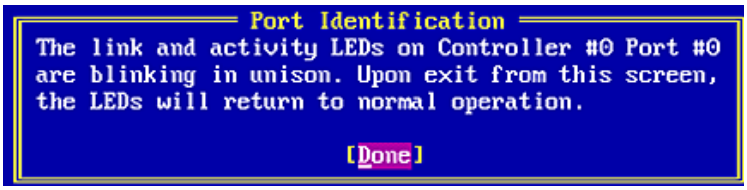
Port Identification
The link and activity LEDs on Controller #0 Port #0
are blinking in unison. Upon exit from this screen,
the LEDs will return to normal operation.
[Done]

Figure 2-7 Port Identification Screen

2. The LEDs on the adapter begin blinking. The selected port's LED status indicators blink on the adapter until you select **Done** on this screen and press **<Enter>**.

Note: Not all adapters have LEDs that are visible externally. If you are using an add-in card in a blade server environment, the port identification or beaconing capability does not work.

Erasing Ports and Adapter Configurations

Note: If this setting is selected, all previous configuration settings are returned to their factory default settings except for the current personality selection. Emulex recommends performing this action to provide a clean environment for new configuration settings to take effect.

To erase the ports and adapter configuration:

1. On the configuration screen, select **Erase Configuration** and press **<Enter>**. A warning is displayed asking if you want to erase the current configuration for all ports of the adapter.
2. Press **<Y>** to delete the configuration. You will receive another warning asking you to confirm the permanent removal of the configuration.
3. Press **<Y>** to delete the configuration.

To exit the PXESelect utility after erasing the ports and adapter configuration:

1. Follow the instructions on the bottom of the individual menu screens until you are prompted to exit.

2. Press **<Y>** to exit. Depending on the settings that were changed, a reboot may be necessary.

   Note: For older systems, depending on the memory allocation method supported, the PXESelect utility automatically reboots even when there are no changes made to the system.

Configuring Emulex Universal Multi-Channel

UMC provides the ability to configure multiple physical functions or I/O channels for each physical adapter port. For additional information on UMC support, see the *Emulex Universal Multi-Channel Reference Guide*.

Notes

- UMC support is available on OCe11100-series adapters only.
- If UMC is enabled and the adapter supports IBM Virtual Fabric Mode or IBM UFP Mode, see "Configuring Multi-Channel for IBM Adapters" on page 35 for additional information. If UMC is disabled or not supported on the adapter, see "Configuring Ports If UMC is Disabled or Not Supported" on page 29.
- If UMC is enabled, you must configure the minimum and maximum bandwidths settings for iSCSI and FCoE storage functions in the NIC BIOS before they can be configured further from their respective utilities (iSCSI or FCoE BIOS). Otherwise, the Logical Link for that function will still be displayed as down, and you will not be able to log into targets or find LUNs behind those targets.
- PXE VLAN is not supported in UMC environments. When using UMC, you should set the LPVID to the same value as the PXE VLAN.
- UMC functionality is supported on Emulex OneConnect® adapters running in 10Gb Ethernet mode only. UMC is not supported in 1GbE mode.
- If the MultiChannel Mode has changed since the last boot, a reboot will occur when you exit the PXESelect utility.

To view the MultiChannel Configuration screen:

1. From the Port Selection Menu screen (Figure 2-4 on page 29), select a port to configure and press **<Enter>**. The MultiChannel Configuration screen (Figure 2-8 on page 33) is displayed.

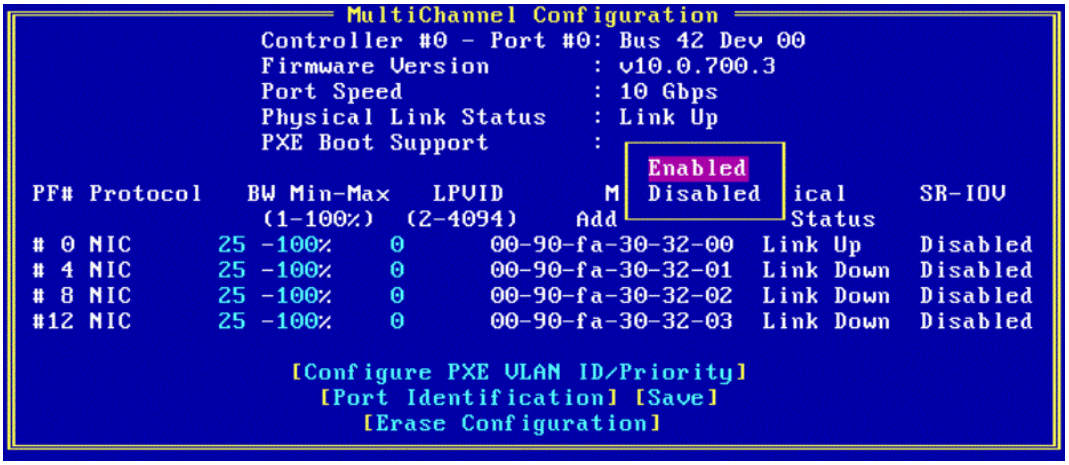
MultiChannel Configuration
Controller #0 - Port #0: Bus 42 Dev 00
Firmware Version : v10.0.700.3
Port Speed : 10 Gbps
Physical Link Status : Link Up
PXE Boot Support :
Enabled
Disabled
PF# Protocol BW Min-Max (1-100%) LPVID (2-4094) M Add ical Status SR-IOV
0 NIC 25 -100% 0 00-90-fa-30-32-00 Link Up Disabled
4 NIC 25 -100% 0 00-90-fa-30-32-01 Link Down Disabled
8 NIC 25 -100% 0 00-90-fa-30-32-02 Link Down Disabled
#12 NIC 25 -100% 0 00-90-fa-30-32-03 Link Down Disabled
[Configure PXE VLAN ID/Priority]
[Port Identification] [Save]
[Erase Configuration]

Figure 2-8 MultiChannel Configuration Screen

Notes

- Logical Link Status is displayed as "N/A" for storage functions.
- SR-IOV support can be enabled only if UMC is disabled.
- If the system does not support UMC, it appears as "N/A" on the MultiChannel Configuration screen (Figure 2-8 on page 33).

2. From the MultiChannel Configuration screen (Figure 2-8 on page 33), you can perform the following tasks:
   - Configure PXE boot support – see "Configuring PXE Boot Support" on page 30 for instructions.
   - Configure PXE VLAN ID/Priority – see "Configuring the PXE VLAN ID and Priority" on page 30 for instructions.
   - Identify ports – see "Physically Identifying the Port" on page 31 for instructions.
   - Erase the port and adapter configuration – see "Erasing Ports and Adapter Configurations" on page 31 for instructions.
   - Configure the minimum and maximum bandwidth for each channel – see "Configuring Minimum and Maximum Bandwidth" on page 33 for instructions.
   - Configure the LPVID for each channel – see "Configuring LPVID" on page 34 for instructions.

   Note: Your adapter or system may not support all UMC options.

Configuring Minimum and Maximum Bandwidth

To configure bandwidth:

1. On the configuration screen, use the **<Tab>** key to select **Minimum Bandwidth** or **Maximum Bandwidth**.
   - The Minimum Bandwidth value is the least amount of bandwidth that the function can provide. It is represented as a percentage. The Minimum

Bandwidth value must be less than or equal to the Maximum Bandwidth value. The total of the Minimum Bandwidth values for all enabled functions on that port must be equal to 100.

Note: A Minimum Bandwidth value of 0 is a valid value. If all of the partitions' Minimum Bandwidth values are zero, the bandwidth is distributed equally among the current active partitions. If a specific partition's Minimum Bandwidth and Maximum Bandwidth values are 0, that partition's logical link will be brought down.

- The Maximum Bandwidth value is the greatest amount of bandwidth that the function can provide. It is represented as a percentage.

2. Enter the value for the specified option and press **<Enter>**.
3. Select **Save** and press **<Enter>**.

Configuring LPVID

The LPVID is used to enforce a VLAN ID on all traffic originating from an IP address, channel, or PCI function. If the operating system for that PCI function has set up a VLAN ID, then the operating system–configured VLAN ID takes precedence over the LPVID for transmit packets, while the operating system–configured VLAN ID and LPVID-tagged packets will both be received. If the operating system has not set up any VLAN IDs, then the LPVID is used for tagging.

Notes

- LPVID and user-configured VLAN IDs from the operating system must be different.
- LPVIDs also need to be configured on the switch port.

Each LPVID must be unique and is relevant for NIC traffic only. The LPVID is not supported for storage functions. For iSCSI storage functions, you must configure a VLAN ID through iSCSISelect or through the host. For additional information, see "Configuring VLAN ID and VLAN Priority" on page 106.

During PXE boot, when the UNDI Driver (BIOS) is functional, the PXE VLAN is used. However, after the NIC driver is operational, the LPVID is used.

Note: PXE VLAN is not supported in UMC environments. When using UMC, you should set the LPVID to the same value as the PXE VLAN.

For example:

```
PXE Install OS
PXE Server configured with VLAN 5
PXE VLAN=5
LPVID for function 0=5
```

To configure LPVID:

1. On the configuration screen, use the **<Tab>** key to select **LPVID**. A dialog box is displayed.

2. Enter a value and press **<Enter>**. The LPVID range is 2–4094. A value of 0 disables the LPVID.
3. Select **Save** and press **<Enter>**.

Configuring Multi-Channel for IBM Adapters

Note: This section pertains to Emulex OneConnect adapters that support Multi-Channel for IBM Virtual Fabric or UFP only.

If you want to enable Multi-Channel on IBM adapters, you must select a Multi-Channel mode.

To configure Multi-Channel:

1. From the Controller Configuration screen (Figure 2-9 on page 35), use the **<Tab>** key to select MultiChannel Mode. A pop-up menu is displayed.

Figure 2-9 Controller Configuration Screen - IBM Adapters

2. Select one of the following settings and press **<Enter>**:
   - Switch Independent Mode
   - IBM Virtual Fabric Mode
   - IBM Unified Fabric Protocol Mode
   - Disabled

   Note: For more information on the available Multi-Channel options, see "Multi-Channel Modes" on page 36.

3. Select **Save** and press **<Enter>**.
4. To proceed, select **Continue** and press **<Enter>**.

With the Multi-Channel option selected, you can now configure Multi-Channel support. See "Multi-Channel Configuration for IBM" on page 36 for more information.

Multi-Channel Modes

Notes

- The following modes are available on IBM adapters and systems that support IBM Virtual Fabric and UFP modes only.
- Multi-Channel for IBM is supported on OneConnect adapters running in 10GbE mode only. Multi-Channel for IBM is not supported in 1GbE mode.

An IBM Virtual Fabric–enabled switch provides the ability to configure an LPVID for a virtual channel or I/O channel on an adapter port. If Multi-Channel for IBM is supported on the system, the PXESelect utility enables you to select one of the following modes:

- IBM Virtual Fabric Mode – select this mode if a OneConnect adapter is attached to an IBM Virtual Fabric–enabled switch.
- IBM Unified Fabric Protocol Mode – select this mode if a OneConnect adapter is attached to an IBM UFP–enabled switch.

Note: Some IBM switches support both UFP and IBM Virtual Fabric Mode.

- Switch Independent Mode – select this mode if you are using a switch other than an IBM Virtual Fabric or UFP-enabled switch. See "Configuring Emulex Universal Multi-Channel" on page 32 for information on configuring Multi-Channel.

Multi-Channel Configuration for IBM

Multi-Channel for IBM provides the ability to configure multiple PCI functions or I/O channels for each physical adapter port.

Notes

- Setting up Multi-Channel for IBM Virtual Fabric or UFP depends on cooperation with adjacent switches.
- See "Configuring Emulex Universal Multi-Channel" on page 32 for information on configuring Multi-Channel for IBM if Switch Independent mode is enabled.

To view the configuration screen:

1. From Port Selection Menu screen (Figure 2-4 on page 29), select the port you want to configure and press **<Enter>**. The configuration screen is displayed.

   If you configure Multi-Channel for IBM on adapters that support IBM Virtual Fabric and UFP modes, the configuration screen will depend on the Multi-Channel mode that has been selected.

Note: For illustration purposes, the screen displays in this section are for a system with IBM Virtual Fabric Mode enabled (Figure 2-10 on page 37).

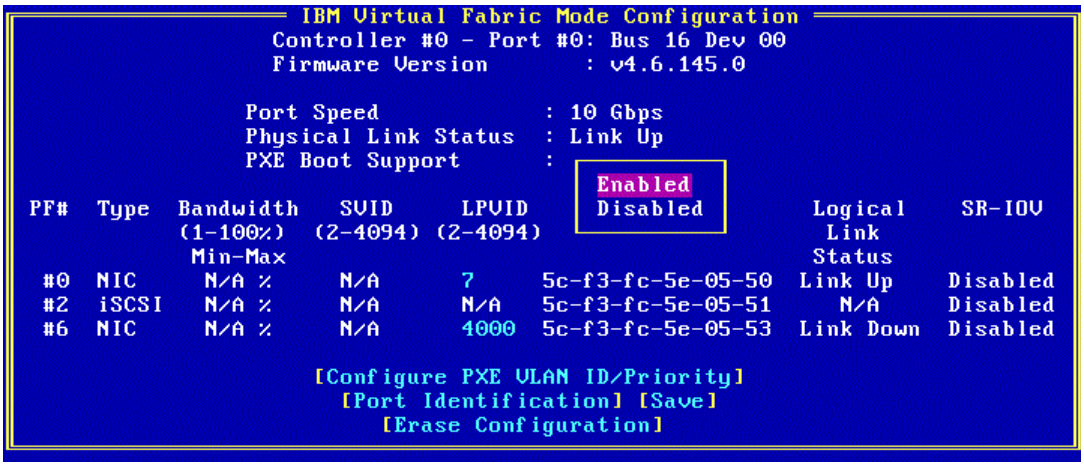
IBM Virtual Fabric Mode Configuration
Controller #0 - Port #0: Bus 16 Dev 00
Firmware Version : v4.6.145.0
Port Speed : 10 Gbps
Physical Link Status : Link Up
PXE Boot Support :
Enabled
Disabled
PF# Type Bandwidth (1-100%) Min-Max SVID (2-4094) LPVID (2-4094) Logical Link Status SR-IOV
#0 NIC N/A % N/A 7 5c-f3-fc-5e-05-50 Link Up Disabled
#2 iSCSI N/A % N/A N/A 5c-f3-fc-5e-05-51 N/A Disabled
#6 NIC N/A % N/A 4000 5c-f3-fc-5e-05-53 Link Down Disabled
[Configure PXE VLAN ID/Priority]
[Port Identification] [Save]
[Erase Configuration]

Figure 2-10 IBM Virtual Fabric Mode Configuration Screen

Notes

- Logical Link Status is displayed as "N/A" for storage functions.
- SR-IOV support can be enabled only if Multi-Channel is disabled.
- If the system does not support Multi-Channel for IBM, it is displayed as "N/A" on the configuration screen.
- The SVID, or Outer VLAN ID, is displayed in IBM Virtual Fabric Mode and IBM Unified Fabric Protocol Mode. This value is provided by the IBM switch and will appear if the protocol modes are configured on the switch and the adapter. If the protocol modes are not configured, a value of "N/A" is displayed.

2. From the configuration screen, you can perform the following tasks:
   - Configure PXE boot support – see "Configuring PXE Boot Support" on page 30 for instructions.
   - Configure PXE VLAN ID/Priority – see "Configuring the PXE VLAN ID and Priority" on page 30 for instructions.
   - Identify ports – see "Physically Identifying the Port" on page 31 for instructions.
   - Erase the port and adapter configuration – see "Erasing Ports and Adapter Configurations" on page 31 for instructions.
   - Configure the LPVID for each channel – see "Configuring LPVID" on page 34 for instructions.

     Note: An LPVID is optional in IBM Virtual Fabric Mode, but it is required for every function in Switch Independent Mode.

Note: If IBM Virtual Fabric Mode or Unified Fabric Protocol Mode is enabled, you must configure the minimum and maximum bandwidth settings on the switch.

Advanced Mode Support

Advanced Mode provides driver compatibility. With Advanced Mode enabled, you can run Advanced Mode-aware drivers that provide the advanced capabilities listed in Table 2-1. With Advanced Mode disabled, you can run older legacy inbox drivers that are not Advanced Mode-aware with the latest firmware versions.

Note: Advanced Mode support is enabled by default on OCe11100-series two-port and four-port adapters and the LPe16202/OCe15100 CNA. On four-port adapters, the Advanced Mode setting is not provided in the PXESelect utility. The Advanced Mode setting on these platforms is implicitly enabled, and Advanced Mode-aware drivers must be installed. Compatibility with legacy drivers requires that Advanced Mode support be disabled on two-port adapters.

Table 2-1 Advanced Mode Capabilities (by Operating System)

Operating System	Advanced Mode Enabled	Advanced Mode Disabled (Legacy Mode)
Windows	16 RSS queues **Note:** Supported on Windows 2008 R2 and later only.	4 RSS Queues
	VMQ lookahead split **Note:** VMQs are supported on Windows Server 2008 R2 and later versions only.	Lookahead split is silently ignored. A small performance penalty for VMQs may occur.
Linux and Citrix	16 RSS queues	4 RSS queues
	VFs and PFs can be increased up to 30	
VMware ESXi	For both 1500 and 9000 MTU: 16 NetQueues per PF in non-VFA 4 NetQueues per PF in VFA	1500 MTU – 8 NetQueues per PF in non-VFA and 4 NetQueues per PF in VFA. 9000 MTU – 4 NetQueues per PF in both VFA and non-VFA

To configure Advanced Mode support:

1. From the Controller Configuration screen (Figure 2-11 on page 38), use the **<Tab>** key to select Advanced Mode Support. A pop-up menu is displayed.

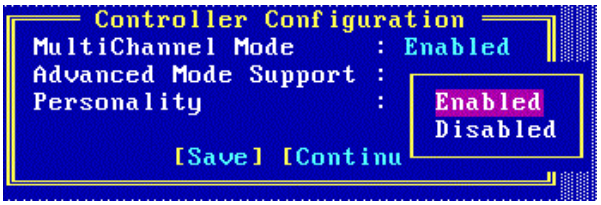

Figure 2-11 Controller Configuration Screen – Advanced Mode Support Selection

2. Select **Enabled** or **Disabled** and press **<Enter>**.
3. Select **Save** and press **<Enter>**.

Personality Option

The "personality" reflects the adapter's protocols. This option specifies a list of available protocols that can be configured on an adapter. Depending on the personalities for which the adapter is licensed, one or more of the following selections is displayed:

- NIC
- iSCSI
- FCoE

The menu displays the available personalities only, including both free and licensed personalities.

The NIC personality implies that all the enabled functions provide NIC/TOE functionality.

Note: TOE is not supported on LPe16202/OCe15000-series adapters.

iSCSI and FCoE personalities are enabled on one function per adapter port and include NIC functionality on the other enabled functions. Only one storage protocol is allowed on each port.

To select the personality of the adapter:

1. From the Controller Configuration screen (Figure 2-12 on page 39), use the **<Tab>** key to select **Personality** and press **<Enter>**. A menu is displayed.

Figure 2-12 Controller Configuration Screen – Personality Selection

2. Select **NIC, iSCSI**, or **FCoE** and press **<Enter>**.
3. Select **Save** and press **<Enter>**.

Note: If the Personality setting has changed since the last boot, a reboot will occur when you exit the PXESelect utility

PXE Boot Parameters Default Values

The default settings for the PXE Boot parameters are listed in Table 2-2, PXE Boot Parameter Default Values, on page 40.

Table 2-2 PXE Boot Parameter Default Values

Parameter	Default Value	Valid Values
Advanced Mode	Enabled (OCe11100-series two-port and four-port adapters and the LPe16202/OCe15100 CNA)	Enabled Disabled
PXE Boot Support	The default for this parameter varies depending on the vendor configuration	Enabled Disabled
SR-IOV	Disabled	Enabled Disabled
VLAN Support	Disabled	Enabled Disabled
VLAN ID	0	0–4094
VLAN Priority	0	0–7
MultiChannel Mode	The default for this parameter varies depending on the vendor configuration	For Emulex adapters: • Enabled • Disabled For IBM adapters: • IBM Virtual Fabric Mode • IBM Unified Fabric Protocol Mode • Switch Independent Mode • Disabled
Minimum Bandwidth	0%	Must have a total of 100% across all ports
Maximum Bandwidth	0%	From the minimum bandwidth value up to 100% (inclusive)
LPVID	0	2–4094

3. Configuring PXE Boot for NIC on OCe14000-series Adapters

Notes

- This section applies only to Emulex OCe14000-series adapters. See chapter 2., "Configuring PXE Boot for NIC on LPe16202 and OCe11100-series Adapters," on page 24 for information specific to those adapters.
- For a Dell OCe14000-based adapter, see appendix G., "Configuring PXE Boot for NIC on Dell OCe14000-based Systems," on page 290.

This section describes using and configuring PXE to boot computers using a network interface independent of available data storage devices (such as hard disks) or installed operating systems.

The PXE protocol is a combination of DHCP and TFTP with subtle modifications to both. DHCP locates the appropriate boot server or servers, and TFTP downloads the initial bootstrap program and additional files.

Network booting enables you to perform the following tasks:

- Boot diskless systems such as thin clients and dedicated systems.
- Deploy software and operating systems for your systems.
- Automate system maintenance, such as backups.
- Automate system checking, such as virus scanning.
- Ensure a system is secure.

Pre-OS

PXE can be used in a "pre-OS" environment. Pre-OS is the process of loading a small operating environment to perform a client management task before loading the final operating system from the local hard drive. For example, with a pre-OS you can scan the hard drive for viruses. This guarantees that the client is not infected before it starts. Another example is the WDS using this feature to install operating systems on local disks or boot from SAN disks.

PXE Boot Process

After PXE boot is enabled in the system UEFI and BIOS, the PXE client can boot up and start up the PXE boot ROM. This is the boot code physically located on the NIC adapter.

Figure 3-1, PXE Boot Process, on page 42 shows the boot process.

Note: To enable or disable PXE boot, it must be enabled or disabled in the system UEFI and BIOS; see the documentation that accompanied the server for more information.

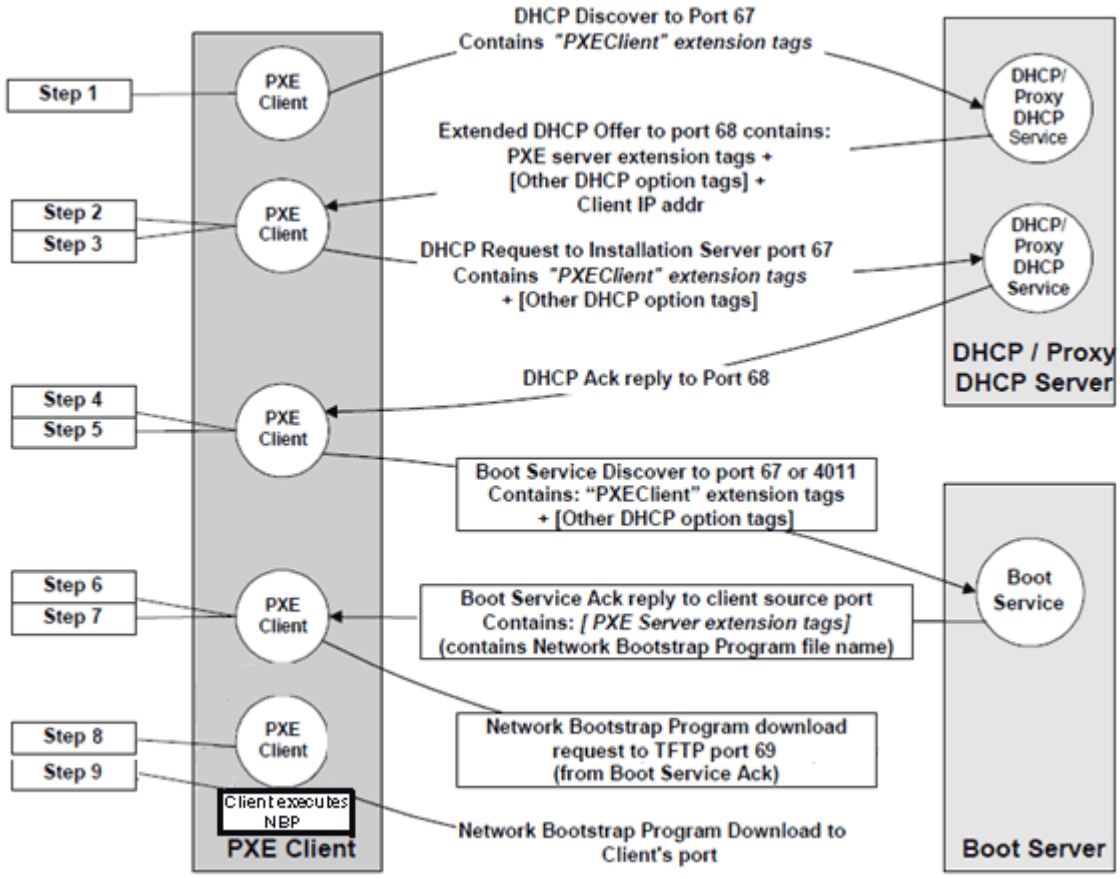

Figure 3-1 PXE Boot Process

1. The PXE boot ROM sends a DHCP request extended with PXE specific options (step 1 in the figure).
2. The DHCP responses contain the DHCP options (DHCPOFFERs) that include the NBP filename and boot server lists (steps 2 through 5).
3. The PXE client attempts to download the specified NBP over TFTP from one of the specified boot servers (steps 6 and 7).
4. The PXE client executes the downloaded NBP (steps 8 and 9).

Note: If any of these steps fail, the boot process typically continues using the next available device in the boot sequence, depending on the system configuration and boot order.

Remotely Installing with PXE for Windows Server 2008, 2008 R2, 2012, and 2012 R2

For remote installation with PXE, a network driver for the Emulex adapter must be part of the client's installation image on the server. The current versions of Windows Server 2008 and Windows Server 2008 R2 do not include network drivers for the Emulex adapter; however, Windows Server 2012 and 2012 R2 include the network driver for the Emulex adapter.

To add the image and installation using the driver with the Remote Installation Service Setup, select:

Start Menu > Programs > Administrative Tools > Remote Installation Services Setup

In addition to the network driver for the Emulex adapter, you must configure the following services to use PXE for remote installations:

- DHCP server
- Remote Installation Services
- Windows Deployment Services

Microsoft provides extensive documentation on deploying its operating systems for remote installations, and different setups may be required depending on your individual implementation. Microsoft provides step-by-step guides for its Windows Deployment Services for configuring the server, adding images, and installing an operating system. It also includes instructions for more advanced tasks like creating multicast transmissions, creating custom images, and performing an unattended installation.

For detailed information on deploying and managing remote installations on Windows Server 2008, Windows Server 2008 R2, Windows Server 2012, and Windows Server 2012 R2, see the Microsoft website and visit Microsoft TechNet. Search on the bulleted terms above to access Microsoft's wide-ranging documentation on these subjects.

Remotely Installing with PXE for Linux and Citrix Servers

Linux allows for PXE installation over a network using the NFS, TFTP, or HTTP protocols. If the system to be installed contains an Emulex NIC or adapter with PXE Boot support, it can be configured to boot from files on another networked system rather than local media.

The Linux distributions provide extensive documentation on deploying and managing remote installations of the Linux operating system using PXE. See the distribution's documentation for instructions on deploying a PXE installation over the network.

For remote installation with PXE, a network driver for the Emulex adapter must be part of the client's installation image on the server. The current Linux distribution may or may not include network drivers for Emulex adapters. If it does, the driver may need to

be added to the operating system's installation image, or added during installation. See the distribution's documentation for instructions on adding drivers during installation.

Using the PXESelect Utility

This section describes how to configure the PXE boot options using the PXESelect utility.

Note: For Dell OCe14000-based adapters, see appendix G., "Configuring PXE Boot for NIC on Dell OCe14000-based Systems," on page 290 for information on using the PXESelect utility.

Navigating the PXESelect Utility

Use the following methods to navigate the PXESelect utility:

- Press the up or down arrows on the keyboard to move through and select menu options or configuration fields. If multiple adapters are listed, use the up and down arrows to scroll to the additional adapters.
- Press the left or right arrows on the keyboard to move through and select setting options.
- Press **<Enter>** to accept a selection, select a menu option, or change a configuration default.
- Press **<F7>** to save the changes on the screen.
- Press **<Esc>** to return to the previous menu or page, cancel a selection or dialog box, or exit the utility.

Running the PXESelect Utility

To run the PXESelect utility, start or restart the computer. When prompted, hold down **<Ctrl>** and press **<P>**. If you are running the PXESelect utility with multiple adapters, all of the adapters are displayed when you start the utility. For example:

```
Press <Ctrl><P> for PXESelect(TM)Utility

Controller#0 Port#0 Base 0xFCE60000 at Bus:05 Dev:00 Fun:00
Controller#0 Port#1 Base 0xFCEA0000 at Bus:05 Dev:00 Fun:01
Controller#1 Port#0 Base 0xFC920000 at Bus:01 Dev:00 Fun:00
Controller#1 Port#1 Base 0xFC960000 at Bus:01 Dev:00 Fun:01
- Initializing ...Done.
```

The PXE Configuration menu appears after the boot BIOS initializes to begin the PXE configuration.

Note: A UEFI-capable system typically does not display the prompt for running the PXESelect utility unless it is configured for legacy booting. See your system configuration manual for information on performing a legacy boot. All configuration that can be performed in the PXESelect utility can instead be performed in the UEFI configuration utility. See chapter 11., "Configuring UEFI

for Ethernet," on page 127 for more information.

Setting Up a PXE Bootable Network

After the PXE boot BIOS is initialized, you can use the PXESelect utility to set up a PXE bootable network by configuring the adapters.

To configure adapters for PXE boot:

1. From the Controller List screen (Figure 3-2 on page 45), use the up or down arrow keys to select the adapter you want to configure and press **<Enter>**.

Figure 3-2 Controller List Screen

Note: The Controller List screen is displayed only if two or more adapters are connected.

The Controller Configuration screen (Figure 3-3 on page 45) is displayed.

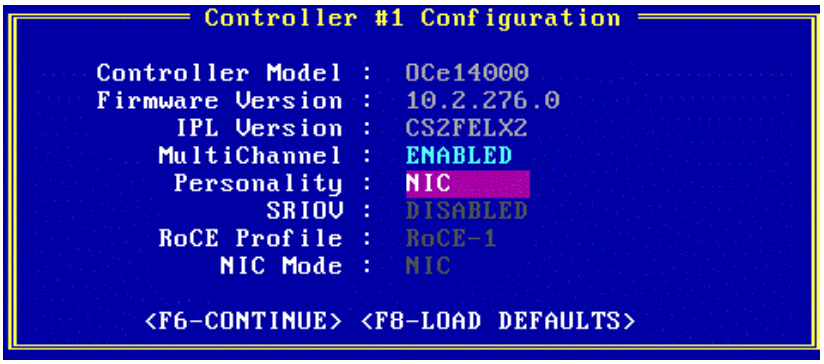

Figure 3-3 Controller Configuration Screen

Depending on the adapter, one or more of the following items are displayed:

- Controller Name – displays the adapter's name.
- Firmware Version – displays the current firmware version.
- IPL Version – displays the IPL version.
- MultiChannel – if UMC is enabled, you can access up to 16 virtual network interfaces. For additional information on UMC, see "Configuring Emulex Universal Multi-Channel" on page 55.

Notes

- If you are using an IBM adapter, see "Configuring Multi-Channel for IBM Adapters" on page 61 for additional information.
- On HP systems, you can select either Disable or Flex-10 for the Multi-Channel setting. If Flex-10 is selected, the settings are only displayed and cannot be configured.

- Personality – This option specifies a list of available protocols that can be configured on an adapter. For additional information on adapter personality, see "Configuring Personality" on page 47.
- SRIOV – if the system BIOS supports SR-IOV, you can enable it if UMC is disabled or it is not supported. For more information on SR-IOV configuration, see "Configuring SR-IOV" on page 50.
- RoCE Profile – This setting is available only if the Personality is set to "NIC+RoCE". For more information, see "Configuring the RoCE Profile" on page 50.
- NIC Mode – This setting is available only if SR-IOV is enabled, Personality is set to "NIC", and a two-port OCe14000-series adapter is in use. For more information, see "Configuring NIC Mode" on page 50.

2. After you have set the options in the Controller Configuration screen, press **<F7>** to save the current settings.
3. Press **<F6>** to proceed.

   Note: If you want to erase the current configuration, press **<F8>**. See "Erasing Ports and Adapter Configurations" on page 54 for more information.

   The Port Selection Menu screen (Figure 3-4 on page 46) is displayed.

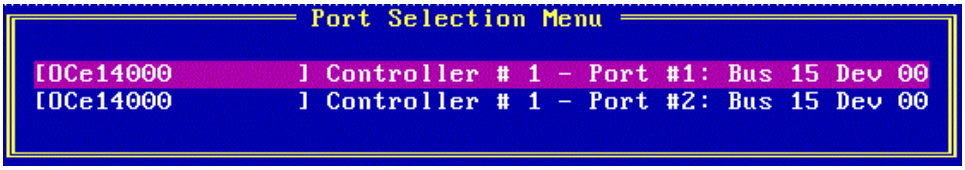

Figure 3-4 Port Selection Menu Screen

   Note: The Port Selection Menu screen is displayed only if two or more ports are connected.

4. Select the port you want to configure and press **<Enter>**. The Port Menu screen is displayed.

   Depending on the installed adapter and the MultiChannel setting, proceed to the following sections:

   - If UMC is disabled or not supported, see "Configuring Ports If UMC is Disabled or Not Supported" on page 47 for additional configuration information.
   - If UMC is enabled, see "Configuring Emulex Universal Multi-Channel" on page 55 for additional configuration information.
   - If UMC is enabled and you are using IBM adapters, see "Configuring Multi-Channel for IBM Adapters" on page 61 for additional configuration information.

Configuring Ports If UMC is Disabled or Not Supported

Note: If UMC is enabled, see "Configuring Emulex Universal Multi-Channel" on page 55. If you are using an IBM adapter, see "Configuring Multi-Channel for IBM Adapters" on page 61.

Configuring Personality

The "personality" reflects the adapter's protocols. This option specifies a list of available protocols that can be configured on an adapter. Depending on the personalities for which the adapter is licensed, one or more of the following selections may appear:

- NIC – implies that all the enabled functions provide NIC functionality
- iSCSI or FCoE – these personalities are enabled on one function per adapter port and include NIC functionality on the other enabled functions

  Note: Only one of each storage protocol is allowed on each port.

- NIC+RoCE – implies that all the enabled functions provide RoCE functionality.
- Custom – for information about custom personalities, see "Configuring the Custom Personality Selection" on page 47.

  ### Notes

  - If NIC+RoCE is enabled, the RoCE Profile selection is available.
  - If SR-IOV is enabled, the NIC+RoCE personality setting is unavailable.
  - RoCE is supported on Windows and Linux only.

The menu displays the available personalities only, including both free and licensed personalities.

Note: Two iSCSI functions and two FCoE functions are not allowed on a single port.

To select the personality of the adapter:

1. From the Controller Configuration screen (Figure 3-3 on page 45), use the up or down arrow keys to select **Personality**.
2. Use the left or right arrow keys to select the desired personality.
3. Press **<F7>** to save.

   Note: If the Personality setting has changed since the last boot, a reboot will occur when you exit the PXESelect utility.

Configuring the Custom Personality Selection

The OCe14000-series adapters support the Custom personality mode when UMC is disabled. The OCe14000-series adapters support NIC, iSCSI, and FCoE protocols on a single port. While the normal NIC, iSCSI, and FCoE personalities support only NIC, NIC+iSCSI, or NIC+FCOE configuration on both ports, the Custom mode allows support for NIC, iSCSI, and FCoE on both ports.

Note: When using the Custom personality mode with UMC disabled, only three functions are available on each port.

With UMC disabled, each port can be configured with one of the following configurations:

- One NIC function
- One NIC function and one iSCSI function
- One NIC function and one FCoE function
- One NIC function, one iSCSI function, and one FCoE function

Notes

- Two of the same storage protocols are not supported on a single port.
- Two NIC functions are not supported on a single port.

Therefore, on a 2-port controller you can potentially have 6 functions, while a 4-port controller can have up to 12 functions. The function-to-port mapping is displayed in Table 3-1, Function-to-Port Mapping for 4-port OCe14000-series Adapters, on page 48 and Table 3-2, Function-to-Port Mapping for 2-port OCe14000-series Adapters, on page 48.

Table 3-1 Function-to-Port Mapping for 4-port OCe14000-series Adapters

Port 0	Port 1	Port 2	Port 3
0	1	2	3
4	5	6	7
8	9	10	11

Table 3-2 Function-to-Port Mapping for 2-port OCe14000-series Adapters

Port 0	Port 1
0	1
2	3
4	5

To select the Custom personality:

1. From the Controller Configuration screen (Figure 3-3 on page 45), use the up or down arrow keys to select **Personality**.
2. Use the left or right arrow keys to select the **Custom** personality.
3. Press **<F6>** to continue. The Port Selection Menu screen (Figure 3-3 on page 45) is displayed.
4. On the Port Selection Menu screen, select the appropriate port. The Port Menu screen (Figure 3-5 on page 49) is displayed.

Figure 3-5 Port Menu Screen (UMC Disabled)

5. On the Port Menu screen, select **NIC Configuration** and press **<Enter>**. The Channels List screen (Figure 3-6 on page 49) is displayed.

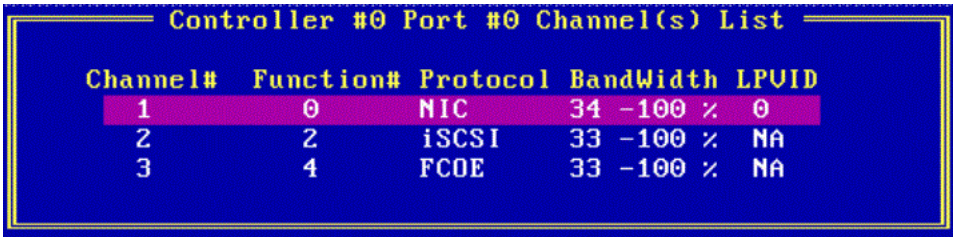
Controller #0 Port #0 Channel(s) List
Channel# Function# Protocol BandWidth LPVID
1 0 NIC 34 -100 % 0
2 2 iSCSI 33 -100 % NA
3 4 FCOE 33 -100 % NA

Figure 3-6 Channels List Screen (UMC Disabled)

6. On the Channels List screen, select the channel that you want to configure and press **<Enter>**. The Channel Configuration screen (Figure 3-7 on page 49) is displayed.

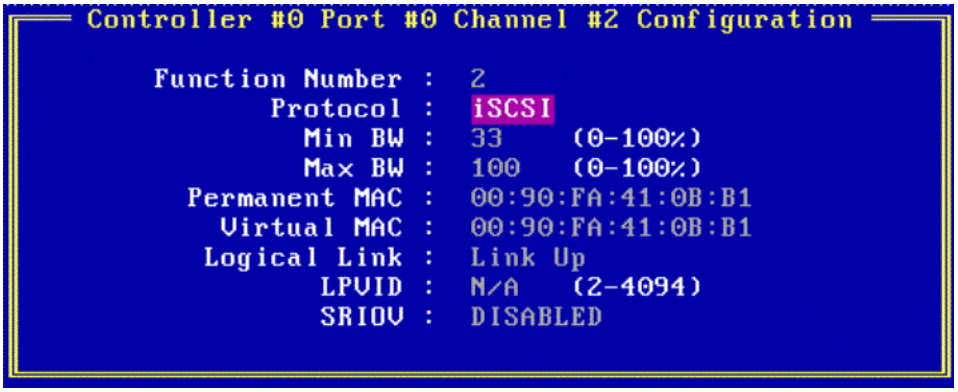
Controller #0 Port #0 Channel #2 Configuration
Function Number : 2
Protocol : iSCSI
Min BW : 33 (0-100%)
Max BW : 100 (0-100%)
Permanent MAC : 00:90:FA:41:0B:B1
Virtual MAC : 00:90:FA:41:0B:B1
Logical Link : Link Up
LPVID : N/A (2-4094)
SRIOV : DISABLED

Figure 3-7 Channel Configuration Screen (UMC Disabled)

7. On the Channel Configuration screen, use the up or down arrow keys to select Protocol.
8. Select the desired personality for the appropriate function using the arrow keys.

   Note: iSCSI and FCoE personalities can only be enabled on one function per adapter port.

9. Press **<F7>** to save.

   Note: If the Personality setting has changed since the last boot, a reboot will occur when you exit the PXESelect utility.

Configuring the RoCE Profile

Note: The RoCE Profile setting is available only when the NIC+RoCE personality is selected.

The RoCE profile allows you to select the appropriate profile for the particular system setup.

- For NFS on Linux, choose the RoCE-1 profile.
- For SMB Direct on Windows Server 2012 and Windows Server 2012 R2, choose the RoCE-2 profile.

Note: Check the Implementer's Lab on the Emulex website for any updated information on additional use cases.

To select a RoCE Profile:

1. From the Controller Configuration screen (Figure 3-3 on page 45), select the NIC+RoCE personality.
2. Use the up or down arrow keys to select **RoCE Profile**.
3. Use the left or right arrow keys to select the desired profile and press **<Enter>**.
4. Press **<F7>** to save.

Configuring SR-IOV

If the system BIOS supports SR-IOV, you can enable it on the adapter. SR-IOV support can be enabled only if Multi-Channel is disabled or not supported.

Note: If SR-IOV is enabled, the NIC+RoCE personality setting is unavailable.

To configure SR-IOV:

1. From the Controller Configuration screen (Figure 3-3 on page 45), use the up or down arrow keys to select **SRIOV**.
2. Use the left or right arrow keys to enable or disable SR-IOV.
3. Press **<F7>** to save.

For more information on SR-IOV configuration, see the appropriate Emulex driver manual.

Configuring NIC Mode

Note: This setting is available on two-port OCe14000-series adapters only if SR-IOV is enabled and the personality is set to “NIC”.

This setting allows you to control the VF count on a two-port OCe14000-series adapter. The choices include:

- NIC – the VF count is restricted to 31 VFs per port and QoS is supported for those VFs.
- NIC-ETS Disabled – the VF count is set to 63 VFs per port but QoS is not supported for those VFs.

To select the NIC Mode:

1. From the Controller Configuration screen (Figure 3-3 on page 45), ensure that the NIC personality is selected and SR-IOV is enabled.
2. Use the up or down arrow keys to select **NIC Mode**.
3. Use the left or right arrow keys to select the desired setting and press **<Enter>**.
4. Press **<F7>** to save.

Loading Default Settings

If you want to erase the current configuration, from the Controller Configuration screen (Figure 3-3 on page 45) press **<F8>**.

See "Erasing Ports and Adapter Configurations" on page 54 for more information.

Selecting a Port

After you have set the options in the Controller Configuration screen (Figure 3-3 on page 45), ensure that you have saved your changes. To save the current settings, press **<F7>**.

To proceed to the Port Selection Menu screen(Figure 3-4 on page 46):

1. From the Controller Configuration screen (Figure 3-3 on page 45), press **<F6>**. The Port Selection Menu screen (Figure 3-4 on page 46) is displayed.

   Note: The Port Selection Menu screen is displayed if two or more ports are connected.

2. Select the port you want to configure and press **<Enter>**. The Port Menu screen (Figure 3-5 on page 49) is displayed.

The Port Menu screen enables you to perform the following tasks:

- View NIC configuration information – see "Viewing NIC Configuration Information" on page 51 for additional information.
- Configure boot options – see "Configuring Boot Options" on page 52 for instructions.
- Configure port options – see "Configuring Port Options" on page 53 for instructions.

Viewing NIC Configuration Information

To view the NIC configuration information:

1. From the Port Menu screen (Figure 3-5 on page 49), use the up or down arrow keys to select **NIC Configuration** and press **<Enter>**. Depending on the currently selected Personality setting, one of the following screens is displayed.
   - If the Personality setting is set to iSCSI or FCoE, the Channels List screen (Figure 3-6 on page 49) is displayed.

     Select a channel using the up or down arrow keys and press **<Enter>**. The Channel Configuration screen (Figure 3-7 on page 49) is displayed.

- If the Personality setting is set to NIC or NIC+RoCE, the Configure Channel screen (Figure 3-7 on page 49) is displayed.

2. From the Channel Configuration screen, you can view the following information:
   - Function number
   - Protocol
   - Minimum bandwidth (Min BW)
   - Maximum bandwidth (Max BW)
   - Permanent and virtual MAC addresses
   - Logical link status
   - Assigned LPVID
   - SR-IOV status

Configuring Boot Options

To view the Boot Configuration screen:

1. From the Port Menu screen (Figure 3-5 on page 49), select **Boot Configuration** and press **<Enter>**. The Boot Configuration screen (Figure 3-8 on page 52) is displayed.

Figure 3-8 Boot Configuration Screen

From the Boot Configuration screen, you can configure PXE boot support.

Configuring PXE Boot Support

To configure PXE boot support:

1. On the Boot Configuration screen (Figure 3-8 on page 52), use the left or right arrow keys to enable or disable the PXE Boot setting.
2. Press **<F7>** to save.

Note: If PXE boot is enabled, during system startup PXE contacts the DHCP server for an IP address to boot from the network.

Configuring Port Options

To view the Port Configuration screen:

1. From the Port Menu screen (Figure 3-5 on page 49), select **Port Configuration** and press **<Enter>**. The Port Configuration screen (Figure 3-9 on page 53) is displayed.

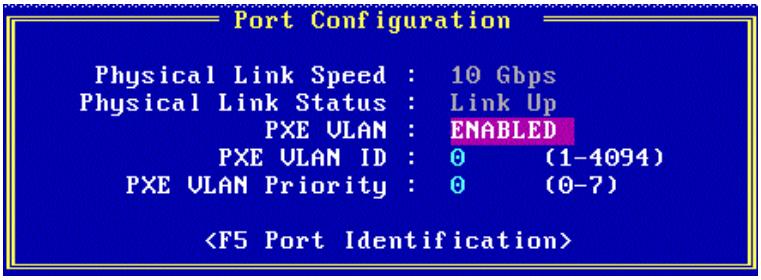

Figure 3-9 Port Configuration Screen

2. From the Port Configuration screen, you can perform the following tasks:
   - View the physical link speed and link status.
   - Configure PXE VLAN, including the PXE VLAN ID and priority – see "Configuring PXE VLAN" on page 53 for instructions.
   - Identify the port – see "Physically Identifying the Port" on page 54 for instructions.

Configuring PXE VLAN

To enable PXE VLAN:

1. On the Port Configuration screen (Figure 3-9 on page 53), use the up or down arrow keys to highlight the current PXE VLAN setting.
2. Use the left or right arrow keys to set PXE VLAN to enabled.
3. Press **<F7>** to save.

To configure a PXE VLAN ID:

1. On the Port Configuration screen (Figure 3-9 on page 53), use the up or down arrow keys to highlight the current PXE VLAN ID setting.
2. Use the left or right arrow keys to select a number from 1 to 4094.
3. Press **<F7>** to save.

To set the priority level:

1. On the Port Configuration screen (Figure 3-9 on page 53), use the up or down arrow keys to highlight the current PXE VLAN Priority setting.
2. Use the left or right arrow keys to select a number from 0 to 7.

   This unique value assigns a priority to outbound packets containing a specified VLAN ID. Valid values range from 0 to 7, with 0 being the highest priority level.
3. Press **<F7>** to save.

After you exit the PXESelect utility, the system will reboot for the configuration to take effect.

Physically Identifying the Port

To physically determine which port you are configuring by causing the link and activity LEDs of that port to blink:

1. On the Port Configuration screen (Figure 3-9 on page 53), press **<F5>**.
2. The LEDs on the adapter begin blinking. The selected port's LED status indicators blink on the adapter for approximately 15 seconds.

Note: Not all adapters have LEDs that are visible externally. If you are using an add-in card in a blade server environment, the port identification or beaconing capability does not work.

Erasing Ports and Adapter Configurations

Note: If this setting is selected, all previous configuration settings are returned to their factory default settings. Emulex recommends performing this action to provide a clean environment for new configuration settings to take effect.

To erase the ports and adapter configuration:

1. On the Controller Configuration screen (Figure 3-3 on page 45), press **<F8>** to restore the factory default settings. A warning is displayed asking if you want to erase the current configuration for all ports of the adapter.
2. Press **<Y>** to delete the configuration. You will receive another warning asking you to confirm the permanent removal of the configuration.
3. Press **<Y>** to delete the configuration.

To exit the PXESelect utility after erasing the ports and adapter configuration:

1. Follow the instructions on the bottom of the individual menu screens until you are prompted to exit.
2. Press **<Y>** to exit. Depending on the settings that were changed, a reboot may be necessary.

   Note: For older systems, depending on the memory allocation method supported, the PXESelect utility automatically reboots even if no changes were made to the system.

Configuring Emulex Universal Multi-Channel

Note: If UMC is enabled and the adapter supports IBM Virtual Fabric Mode or IBM UFP Mode, see "Configuring Multi-Channel for IBM Adapters" on page 61 for additional information. If UMC is disabled or not supported on the adapter, see "Configuring Ports If UMC is Disabled or Not Supported" on page 47.

Enabling UMC

UMC provides the ability to configure multiple physical functions or I/O channels for each physical adapter port. For additional information on UMC support, see the *Emulex Universal Multi-Channel Reference Guide*.

Notes

- If UMC is enabled, you must configure the minimum and maximum bandwidths settings for iSCSI and FCoE storage functions in the NIC BIOS before they can be configured further from their respective utilities (iSCSI or FCoE BIOS). Otherwise, the Logical Link for that function will still appear as down, and you will not be able to log into targets or find LUNs behind those targets.
- PXE VLAN is not supported in UMC environments. When using UMC, you should set the LPVID of the first function to the same value as the PXE VLAN.
- UMC functionality is supported on OneConnect adapters running in 10GbE or 40GbE mode only. UMC is not supported in 1GbE mode.
- SR-IOV is not available if UMC is enabled.

To enable UMC:

1. From the Controller Configuration screen (Figure 3-3 on page 45), use the up or down arrow keys to select **MultiChannel**.
2. Use the left or right arrow keys to enable UMC.
3. Press **<F6>** to proceed.

ARI Support

The OCe14000-series adapters support ARI, which provides the ability to configure additional PCI functions or I/O channels for each physical adapter port if UMC is enabled.

You can configure up to 16 functions on a one-port OCe14400-series adapter, up to 8 functions per port on a one or two-port OCe14100-series adapter, and up to 4 functions per port on a four-port OCe14100-series adapter.

The maximum number of functions allowed on an adapter is controlled by the adapter's IPL file and the system's support for ARI.

The following requirements must be met in order to support more than eight functions on an adapter.

- The system hardware (the motherboard and BIOS) must support ARI.
- ARI must be enabled in the system BIOS.

- The host operating system must support ARI:
  - Windows Server 2012 and newer versions
  - RHEL 5.9 and newer versions
  - RHEL 6.4 and newer versions
  - SLES 11 SP2 and newer versions
  - ESXi 5.1 and newer versions
- The application management tools, including the Emulex OneCommand® Manager application, must support ARI.
- ARI must be enabled in the firmware using the OneCommand Manager application.

If these conditions are not met, you may be able to configure more than eight functions, but only up to eight functions will be running and discovered after a reboot.

Configuring Personality

The "personality" reflects the adapter's protocols. This option specifies a list of available protocols that can be configured on an adapter. Depending on the personalities for which the adapter is licensed, one or more of the following selections is displayed:

- NIC – implies that all the enabled functions provide NIC functionality
- iSCSI or FCoE – these personalities are enabled on one function per adapter port and include NIC functionality on the other enabled functions

  Notes

  - Only one of each storage protocol is allowed on each port.
  - Two iSCSI functions and two FCoE functions are not allowed on a single port.
- Custom – for information about custom personalities, see "Configuring the Custom Personality Selection" on page 57

The menu displays the available personalities only, including both free and licensed personalities.

To select the personality of the adapter:

1. From the Controller Configuration screen (Figure 3-3 on page 45), use the up or down arrow keys to select **Personality**.
2. Use the left or right arrow keys to select the desired personality.
3. Press **<F7>** to save.

   Note: If the Personality setting has changed since the last boot, a reboot will occur when you exit the PXESelect utility.

Configuring the Custom Personality Selection

The Custom personality allows you to select the protocol type for each function. The first function on the port must always be assigned the NIC personality. iSCSI and FCoE personalities can be enabled on one function per adapter port only.

Note: Two iSCSI functions and two FCoE functions are not allowed on a single port.

To select the Custom personality:

1. From the Controller Configuration screen (Figure 3-3 on page 45), use the up or down arrow keys to select **Personality**.
2. Use the left or right arrow keys to select the **Custom** personality.
3. Press **<F6>** to continue. The Port Selection Menu screen (Figure 3-3 on page 45) is displayed.
4. On the Port Selection Menu screen, select the appropriate port. The Port Menu screen (Figure 3-10 on page 57) is displayed.

Figure 3-10 Port Menu Screen (UMC Enabled)

1. On the Port Menu screen, select **MultiChannel Configuration** and press **<Enter>**. The Channels List screen (Figure 3-11 on page 57) is displayed.

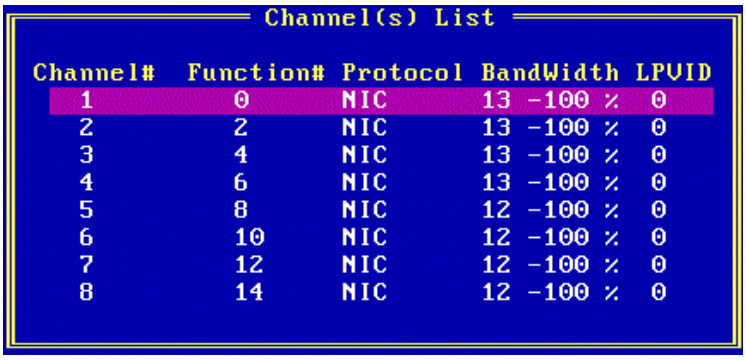
Channel(s) List
Channel# Function# Protocol BandWidth LPVID
1 0 NIC 13 -100 % 0
2 2 NIC 13 -100 % 0
3 4 NIC 13 -100 % 0
4 6 NIC 13 -100 % 0
5 8 NIC 12 -100 % 0
6 10 NIC 12 -100 % 0
7 12 NIC 12 -100 % 0
8 14 NIC 12 -100 % 0

Figure 3-11 Channels List Screen (UMC Enabled)

2. On the Channels List screen, select the channel that you want to configure and press **<Enter>**. The Channel Configuration screen (Figure 3-12 on page 58) is displayed.

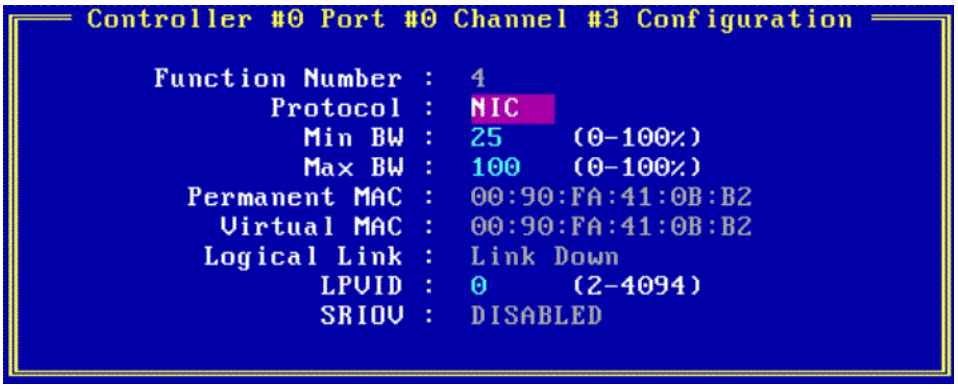
Controller #0 Port #0 Channel #3 Configuration
Function Number : 4
Protocol : NIC
Min BW : 25 (0-100%)
Max BW : 100 (0-100%)
Permanent MAC : 00:90:FA:41:0B:B2
Virtual MAC : 00:90:FA:41:0B:B2
Logical Link : Link Down
LPVID : 0 (2-4094)
SRIOV : DISABLED

Figure 3-12 Channel Configuration Screen (UMC Enabled)

3. On the Channel Configuration screen, use the up or down arrow keys to select Protocol.
4. Select the desired personality for the appropriate function using the arrow keys.

   iSCSI and FCoE personalities can only be enabled on one function per adapter port.
5. Press **<F7>** to save.

   Note: If the Personality setting has changed since the last boot, a reboot will occur when you exit the PXESelect utility.

Loading Default Settings

If you want to erase the current configuration, from the Controller Configuration screen (Figure 3-3 on page 45), press **<F8>**.

See "Erasing Ports and Adapter Configurations" on page 54 for more information.

Selecting a Port

After you have set the options in the Controller Configuration screen, ensure that you have saved your changes. To save the current settings, press **<F7>**.

To proceed to the Port Selection menu:

1. From the Controller Configuration screen (Figure 3-3 on page 45), press **<F6>**. The Port Selection Menu screen (Figure 3-4 on page 46) is displayed.

   Note: The Port Selection Menu screen is displayed if two or more ports are connected.
2. Use the up or down arrow keys to select the port you want to configure and press **<Enter>**. The Port Menu screen (Figure 3-10 on page 57) is displayed.

The Port Menu screen enables you to perform the following tasks:

- Configure UMC options – see "Configuring UMC Options" on page 59 for instructions.

- Configure boot options – see "Configuring Boot Options" on page 52 for instructions.
- Configure port options – see "Configuring Port Options" on page 53 for instructions.

Configuring UMC Options

To configure the UMC options:

1. From the Port Menu screen (Figure 3-10 on page 57), use the up or down arrow keys to select **MultiChannel Configuration** and press **<Enter>**. The Channels List screen (Figure 3-11 on page 57) is displayed.
2. Select a channel using the up or down arrow keys and press **<Enter>**. The Channel Configuration screen (Figure 3-13 on page 59) is displayed.

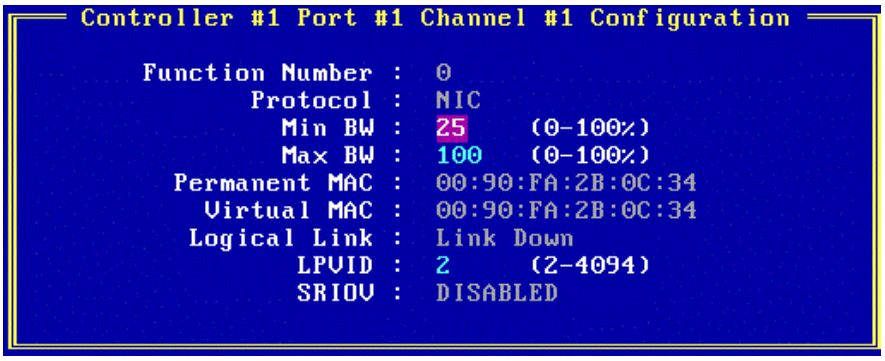
Controller #1 Port #1 Channel #1 Configuration
Function Number : 0
Protocol : NIC
Min BW : 25 (0-100%)
Max BW : 100 (0-100%)
Permanent MAC : 00:90:FA:2B:0C:34
Virtual MAC : 00:90:FA:2B:0C:34
Logical Link : Link Down
LPVID : 2 (2-4094)
SRIOV : DISABLED

Figure 3-13 Channel Configuration Screen (UMC Enabled)

3. From the Channel Configuration screen, you can perform the following tasks:
   - View the function number.
   - Select the protocol for each function, except for the first listed function. See "Configuring Personality" on page 56 for instructions.
   - Configure the minimum and maximum bandwidth for each channel. See "Configuring Minimum and Maximum Bandwidth" on page 60 for instructions.
   - View the permanent and virtual MAC addresses.
   - View the logical link status.

     Note: Logical Link Status is displayed as "N/A" for storage functions.

   - Configure the LPVID for each channel. For more information, see "Configuring LPVID" on page 60.
   - View the SR-IOV status.

     Note: SR-IOV is automatically disabled if UMC is enabled.

Note: Your adapter or system may not support all UMC options.

Configuring Minimum and Maximum Bandwidth

To configure bandwidth:

1. On the Channel Configuration screen (Figure 3-12 on page 58), use the use the up or down arrow keys to select **Min BW** or **Max BW**.
2. Use the left or right arrow keys to select the desired bandwidth value.
   - The Minimum Bandwidth value is the least amount of bandwidth that the function can provide. It is represented as a percentage. The Minimum Bandwidth value must be less than or equal to the Maximum Bandwidth value. The total of the Minimum Bandwidth values for all enabled functions on that port must be equal to 100.

     Note: A Minimum Bandwidth value of 0 is a valid value. If all of the partitions' Minimum Bandwidth values are zero, the bandwidth is distributed equally among the current active partitions. If a specific partition's Minimum Bandwidth and Maximum Bandwidth values are 0, that partition's logical link will be brought down.

   - The Maximum Bandwidth value is the greatest amount of bandwidth that the function can provide. It is represented as a percentage.
3. Press **<F7>** to save.

Configuring LPVID

The LPVID is used to enforce a VLAN ID on all traffic originating from an IP address, channel, or PCI function. If the operating system for that PCI function has set up a VLAN ID, then the operating system–configured VLAN ID takes precedence over the LPVID for transmit packets, while both the operating system–configured VLAN ID and LPVID–tagged packets will be received. If the operating system has not set up any VLAN IDs, then the LPVID is used for tagging.

Notes

- LPVID and user-configured VLAN IDs from the operating system must be different.
- LPVIDs must be configured on the switch port.

Each LPVID must be unique and is relevant for NIC traffic only. The LPVID is not supported for storage functions. For iSCSI storage functions, you must configure a VLAN ID through iSCSISelect or through the host. For additional information, see "Configuring VLAN ID and VLAN Priority" on page 106.

During PXE boot when the UNDI driver (BIOS) is functional, the PXE VLAN is used. However, after the NIC driver is operational the LPVID is used.

Note: PXE VLAN is not supported in UMC environments. When using UMC, you should set the LPVID to the same value as the PXE VLAN.

For example:

```
PXE Install OS
```

```
PXE Server configured with VLAN 5
PXE VLAN=5
LPVID for function 0=5
```

To configure LPVID:

1. On the Configure Channel screen (Figure 3-13 on page 59), use the use the up or down arrow keys to select **LPVID**.
2. Use the left or right arrow keys to select the desired LPVID value. The LPVID range is 2–4094. A value of 0 disables the LPVID.
3. Press **<F7>** to save.

Configuring Multi-Channel for IBM Adapters

Note: This section pertains to certain Emulex OneConnect adapters that support Multi-Channel for IBM Virtual Fabric or UFP only.

If you want to enable Multi-Channel on IBM adapters, you must select a Multi-Channel mode.

To select a Multi-Channel mode:

1. From the Controller Configuration screen (Figure 3-14 on page 61), use the up or down arrow keys to select Multichannel Mode.

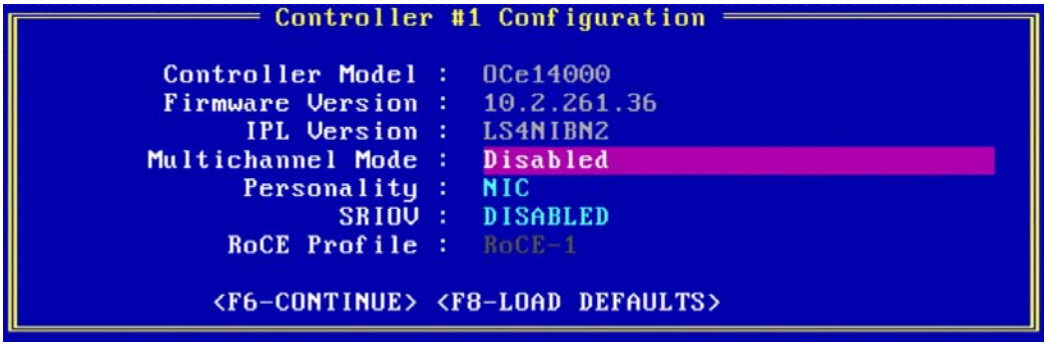

Figure 3-14 Controller Configuration Screen - IBM Adapters

2. Use the left or right arrow keys to select one of the following settings and press **<Enter>**:
   - Switch Independent Mode
   - IBM Virtual Fabric Mode
   - IBM Unified Fabric Protocol Mode
   - Disabled

   Note: For more information on the available Multi-Channel modes, see "Multi-Channel Modes" on page 62.

3. Press **<F6>** to proceed.

With the Multi-Channel mode selected, you can now configure Multi-Channel for IBM support. See "Multi-Channel Configuration for IBM" on page 62 for more information.

Multi-Channel Modes

Note: The following modes are available only on IBM adapters and systems that support IBM Virtual Fabric and UFP modes.

An IBM Virtual Fabric–enabled switch provides the ability to configure an LPVID for a virtual channel or I/O channel on an adapter port. If Multi-Channel for IBM is supported on the system, the PXESelect utility enables you to select one of the following modes:

- IBM Virtual Fabric Mode – select this mode if a OneConnect adapter is attached to an IBM Virtual Fabric–enabled switch.
- IBM Unified Fabric Protocol Mode – select this mode if a OneConnect adapter is attached to an IBM UFP-enabled switch.

  Note: Some IBM switches support both UFP and IBM Virtual Fabric Mode.

- Switch Independent Mode – select this mode if you are using a switch other than an IBM Virtual Fabric or UFP-enabled switch. If this mode is enabled, see "Configuring Emulex Universal Multi-Channel" on page 55 for information on configuring Multi-Channel for IBM.

Note: Multi-Channel for IBM is supported on OneConnect adapters running in 10GbE mode only. Multi-Channel for IBM is not supported in 1GbE mode.

Multi-Channel Configuration for IBM

Multi-Channel for IBM provides the ability to configure multiple PCI functions or I/O channels for each physical adapter port.

Notes

- Setting up Multi-Channel for IBM Virtual Fabric or UFP depends on cooperation with adjacent switches.
- See "Configuring Emulex Universal Multi-Channel" on page 55 for information on configuring Multi-Channel for IBM if Switch Independent mode is enabled.

To view the configuration screen:

1. From Port Selection Menu screen (Figure 3-4 on page 46), select the port you want to configure and press **<Enter>**. The configuration screen is displayed.

   If you are configuring Multi-Channel for IBM, the configuration options will depend on the Multi-Channel mode that has been selected.

Note: For illustration purposes, the screen displays in this section are for a system with the IBM Virtual Fabric Mode selected.

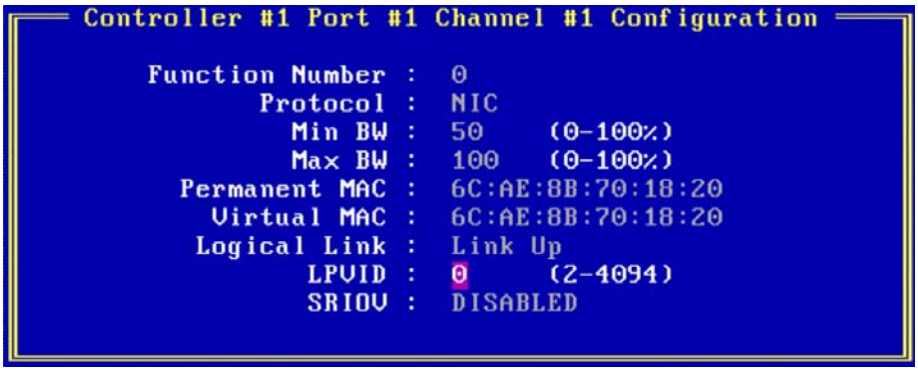
Controller #1 Port #1 Channel #1 Configuration
Function Number : 0
Protocol : NIC
Min BW : 50 (0-100%)
Max BW : 100 (0-100%)
Permanent MAC : 6C:AE:8B:70:18:20
Virtual MAC : 6C:AE:8B:70:18:20
Logical Link : Link Up
LPVID : 0 (2-4094)
SRIOV : DISABLED

Figure 3-15 IBM Virtual Fabric Mode Multi-Channel Configuration Screen

Note: If the system does not support some of the Multi-Channel options, the unavailable options are disabled on the Channel Configuration screen.

2. From the Channel Configuration screen (Figure 3-15 on page 63), you can perform the following tasks:
   - View the function number.
   - Select the protocol for each function, except for the first listed function. See "Configuring Personality" on page 56 for instructions.

     Note: The Custom personality is not supported on IBM adapters and systems.

   - Configure the minimum and maximum bandwidth for each channel. See "Configuring Minimum and Maximum Bandwidth" on page 60 for instructions.

     Note: If Switch Independent Mode is enabled, you must configure the minimum and maximum bandwidth settings on the switch.

   - View the permanent and virtual MAC addresses.
   - View the logical link status.

     Note: Logical Link Status is displayed as "N/A" for storage functions.

   - Configure the LPVID for each channel. For more information, see "Configuring LPVID" on page 60.

     Note: An LPVID is optional for IBM Virtual Fabric Mode, but it is required for every function if Switch Independent Mode is selected.

   - View the SR-IOV status.

     Note: SR-IOV is automatically disabled if Multi-Channel is enabled.

PXE Boot Parameters Default Values

The default settings for the PXE Boot parameters are listed in Table 3-3, PXE Boot Parameter Default Values, on page 64.

Table 3-3 PXE Boot Parameter Default Values

Parameter	Default Value	Valid Values
UMC (Emulex) or Multichannel Mode (IBM)	The default for this parameter varies depending on the vendor configuration.	For Emulex adapters: • Enabled • Disabled For IBM adapters: • IBM Virtual Fabric Mode • IBM Unified Fabric Protocol Mode • Switch Independent Mode • Disabled
Personality	The default for this parameter varies depending on the vendor configuration.	If UMC is enabled: • NIC • iSCSI • FCoE • Custom If UMC and SR-IOV are disabled: • NIC • iSCSI • FCoE • NIC+RoCE **Note:** RoCE is supported on Windows and Linux only. If UMC is disabled and SR-IOV is enabled: • NIC • iSCSI • FCoE
SR-IOV	Disabled	Enabled Disabled
RoCE Profile **Note:** This setting is only available if the NIC+RoCE personality is selected.	RoCE-1	RoCE-1 RoCE-2
Minimum Bandwidth	0%	Must have a total of 100% across all enabled function on that port
Maximum Bandwidth	0%	From the minimum bandwidth value up to 100% (inclusive)
LPVID	0	2–4094

Table 3-3 PXE Boot Parameter Default Values (Continued)

Parameter	Default Value	Valid Values
PXE Boot Support	The default for this parameter varies depending on the vendor configuration.	Enabled Disabled
PXE VLAN	Disabled	Enabled Disabled
PXE VLAN ID	0	2–4094
PXE VLAN Priority	0	0–7

4. Configuring Boot from SAN for the FCoE Protocol

When booting from SAN, the storage device is typically identified by its WWPN and a LUN. By extending the server system BIOS, boot from SAN capability is provided by the boot BIOS contained on an Emulex adapter in the server. If properly configured, the adapter then permanently directs the server to boot from a logical unit (disk) on the SAN as if it were a local disk.

Note: Not all procedures are required. Emulex adapters usually ship from the factory with the latest version of boot code installed and enabled, so you do not need to install or enable boot code in those cases. However, if boot code is not enabled, you must enable it. You may want to update the boot code if a more current version is available on the Emulex website at http://www.emulex.com.

This section describes how to set up a system to boot from SAN. The specific procedure to follow is determined by the system architecture and the operating system.

Table 4-1 Boot from SAN Procedures

Architecture	Operating System	Procedure
x86 and x64	Windows Server 2008, Windows Server 2008 R2, Windows Server 2012 and Windows Server 2012 R2	"Installing Windows Server on a Boot Disk (x64)" on page 69.
	Linux	"Configuring Boot from SAN on Linux, Citrix, or VMware (x86 and x64)" on page 70.
	VMware	
	Solaris (SFS driver)	"Configuring Boot from SAN on Solaris (x86 and x64)" on page 71.
PowerPC	Solaris (SFS driver)	"Configuring Boot from SAN on Solaris (x86 and x64)" on page 71.
EFI-based systems	Windows Server 2008, Windows Server 2008 Windows Server R2, Windows Server 2012 and Windows Server 2012 R2	"Configuring Boot from SAN on Windows (UEFI)" on page 67 "Configuring Boot from SAN on Linux or VMware (UEFI)" on page 70.

Windows Server

This section explains how to configure boot from SAN on Windows Server operating systems.

Configuring Boot from SAN on Windows (x64)

To configure boot from SAN:

1. If necessary, update the boot code on the adapter. See chapter 7., "Updating and Enabling Boot Code," on page 96 for more information.
2. If necessary, enable the boot code on the adapter. See chapter 7., "Updating and Enabling Boot Code," on page 96 for more information.
3. Enable the adapter to boot from SAN. See "Enabling an Adapter to Boot from SAN" on page 80 for more information.
4. Configure boot devices. See "Configuring Boot Devices" on page 82 for more information.
5. If desired, configure the boot options on the adapter. See "Configuring Advanced Adapter Parameters" on page 86 for more information.
6. Install the operating system on a boot disk.

   For additional information, see "Installing Windows Server on a Boot Disk (x64)" on page 69.

Configuring Boot from SAN on Windows (UEFI)

To configure boot from SAN:

1. If necessary, update the boot code on the adapter. See chapter 7., "Updating and Enabling Boot Code," on page 96 for more information.
2. If necessary, enable the boot code on the adapter. See "Enabling an Adapter to Boot from SAN" on page 80 for more information.
3. Configure boot devices. See "Configuring Boot Devices" on page 82 for more information.
4. If desired, configure the boot options on the adapter. See "Configuring Advanced Adapter Parameters" on page 86 for more information.
5. Install the operating system on a boot disk:
   - For a new installation of a UEFI-aware operating system on a UEFI-based x64 server, see "Installing a New Windows UEFI-aware Operating System on a UEFI-based x64 Server" on page 68.
   - For Windows Server 2008, 2012, or 2012 R2, see "Installing Windows Server on a Boot Disk (x64)" on page 69.

Installing a New Windows UEFI-aware Operating System on a UEFI-based x64 Server

This installation procedure assumes LUNs are created in the SAN storage device and zoned appropriately to the host adapter's WWN.

To install a new Windows Server UEFI-aware operating system:

1. From the server system UEFI setup, ensure that "CD/DVD" is the first device in the boot order list.
2. Enable the adapter BIOS setting to allow SAN boot in the Emulex UEFI configuration utility.
3. Configure the boot target and LUN in the Emulex UEFI configuration utility to select the desired target.
4. Boot the host server with the Windows Server DVD inserted. Follow the on-screen prompts to install the appropriate version of Windows Server.

   The Windows installation exposes all available and visible LUNs as disks and partitions numbered 0 to N, where N is the highest number available. These numbers typically are the LUN numbers assigned by the array.
5. Select the disk on which you want to install the operating system.
6. Follow system prompts in the Windows installation.

   Note: By default, Microsoft Windows Server installs with a GPT-formatted disk on an UEFI-aware server.

After the installation is complete, Windows Boot Manager, which is available from the Start Options menu of the host server UEFI, is populated with a media device path pointing to the Windows boot loader utility.

The Windows Boot Manager option is inserted as the first boot option in the boot order list of the host server UEFI. The "CD/DVD" is the second device in the boot order list.

Upon reboot, the system boots from the LUN set up on the SAN.

Directing a UEFI-based Server to a Windows Server Operating System Image (Installed as UEFI-aware) Already Installed on the SAN

This installation procedure assumes a LUN exists in the SAN storage device, is zoned appropriately to the host adapter's WWN, and a UEFI-aware operating system resides on the target LUN.

To direct a UEFI-based server to a Windows Server operating system image:

1. Enable network boot in the Emulex UEFI configuration utility. See "Enabling an Adapter to Boot from SAN" on page 197 for more information.
2. Configure the boot target and LUN in the Emulex UEFI configuration utility to point to the desired target. See "Adding Boot Devices" on page 200 for more information.

3. Select **Boot Manager** from the system UEFI configuration manager.
4. Select **Add Boot Option**.
5. Identify the desired target in the list, and continue down the explorer path until you locate the bootmgfw.efi file. This file is the boot loader utility for the Windows Server UEFI-aware operating system installation.
6. Input a boot device description (for example, Win2K8_UEFI_SAN) and optional data (if desired) for this device and select **Commit Changes**.
7. From the Windows Boot Manager, select **Change Boot Order**.
8. Move the previous input description name (Win2K8_UEFI_SAN) to the desired position in the boot order.
9. Select **Commit Changes**. The Start Options list now reflects the boot order changes.

   Upon reboot, the server is able to boot from this target LUN on the SAN.

Installing Windows Server on a Boot Disk (x64)

This procedure installs Windows Server onto an unformatted disk drive and configures the system to boot from the SAN disk drive.

Note: The computer's system BIOS may require that another adapter take precedence over the Emulex adapter during boot. If this occurs, you must disconnect or disable the other adapter. This allows you to configure and build the operating system on the drive connected to the Emulex adapter.

To install Windows Server on a boot disk:

1. Install the Emulex driver for Windows as described in the *Emulex Drivers for Windows User Manual*.
2. In Windows Explorer, navigate to the folder you specified during driver installation.
3. In the \AutoPilot Installer\Drivers*drivername* folder, open the folder that corresponds to your computer type, such as x64. *drivername* is the type of driver you downloaded.
4. Copy all the files in this folder onto a formatted floppy disk or a USB device.
5. Boot the target system with the Windows Server setup media. The Install Windows splash screen is displayed.
6. Configure the language, time and date and keyboard values. Click **Next**. Another splash screen is displayed.
7. Click **Install Now**. The Where do you want to install Windows? screen is displayed.
8. Click **Load Driver**. Browse to the floppy disk or USB device that contains the driver to load the driver for the appropriate operating system. After selecting the driver, the correct driver location and driver are displayed under the Select driver to be installed screen.
9. Select **Next**. After the driver is loaded, the Where do you want to install Windows? screen is displayed.

10. Select the same drive you configured as the boot device. See "Configuring Boot Devices" on page 82.

Linux, Citrix, and VMware

This section explains how to configure boot from SAN on Linux, Citrix, and VMware operating systems.

Configuring Boot from SAN on Linux, Citrix, or VMware (x86 and x64)

To configure boot from SAN:

1. If necessary, update the boot code on the adapter. See chapter 7., "Updating and Enabling Boot Code," on page 96 for more information.
2. If necessary, enable the boot code on the adapter. See chapter 7., "Updating and Enabling Boot Code," on page 96 for more information.
3. Enable the adapter to boot from SAN. See "Enabling an Adapter to Boot from SAN" on page 80 for more information.
4. If necessary, enable spinup delay. See "Enabling or Disabling the Spinup Delay" on page 89 for more information.
5. Configure boot devices. See "Configuring Boot Devices" on page 82 for more information.
6. If desired, configure the boot options on the adapter. See "Configuring Advanced Adapter Parameters" on page 86 for more information.
7. Use the driver on the operating system distribution disk to boot the system. If necessary, you can update the driver to the latest version.

Configuring Boot from SAN on Linux or VMware (UEFI)

To configure boot from SAN:

1. If necessary, update the latest boot code on the adapter. See chapter 7., "Updating and Enabling Boot Code," on page 96 for more information.
2. If necessary, enable the boot code on the adapter. See chapter 7., "Updating and Enabling Boot Code," on page 96 for more information.
3. Configure boot devices. See "Enabling an Adapter to Boot from SAN" on page 80 for more information.
4. If desired, configure the boot options on the adapter. See "Configuring Advanced Adapter Parameters" on page 86 for more information.
5. Use the driver on the operating system distribution disk to boot the system. If necessary, you can update the driver to the latest version.

Solaris

This section explains how to configure boot from SAN on the Solaris operating system.

Configuring Boot from SAN on Solaris (x86 and x64)

To configure boot from SAN:

1. If necessary, update the boot code on the adapter. See chapter 7., "Updating and Enabling Boot Code," on page 96 for more information.
2. If necessary, enable the boot code on the adapter. See chapter 7., "Updating and Enabling Boot Code," on page 96 for more information.
3. Enable the adapter to boot from SAN. See "Enabling an Adapter to Boot from SAN" on page 80 for more information.
4. If necessary, enable spinup delay. See "Enabling or Disabling the Spinup Delay" on page 89 for more information.
5. Configure boot devices. See "Configuring Boot Devices" on page 82 for more information.
6. If desired, configure the boot options on the adapter. See "Configuring Advanced Adapter Parameters" on page 86 for more information.
7. Boot the Solaris installation CD and follow the prompts.

   Note: If you need help determining the LUNs to select for boot from SAN, see "Determining LUNs to Select for Boot from SAN" on page 71.

Determining LUNs to Select for Boot from SAN

To determine which LUNs to select:

1. Open a terminal window and leave it open.
2. In the terminal window, select the LUN you are going to use as the SAN boot disk (not the local drive) using the luxadm probe command. This shows all the available LUNs. Record this LUN information, which is used throughout this procedure. LUN 0 is used in the example:

   ```
   luxadm probe

   Found Fibre Channel device(s):
      Node WWN:50060e8003823800 Device Type:Disk device
      Logical Path:/dev/rdsk/c5t226000C0FF9833AFd6s2
      Node WWN:50060e8003823800 Device Type:Disk device
      Logical Path:/dev/rdsk/c5t226000C0FF9833AFd6s2
   Node WWN:50060e8003823800 Device Type:Disk device
   ```

3. Copy the /dev/rdsk/*nnn* part of the path statement for a drive.
4. In the terminal window, use the luxadm display command to show the WWPN or the LUN for which you selected the path in the prior step:

   ```
   luxadm display </dev/rdsk/nnn>
   ```

5. Record this LUN or WWPN information for use in the procedure.

5. Configuring x86/x64 Platforms for the iSCSI Protocol

iSCSI is an IP-based standard for linking data-storage devices over a network and transferring data by carrying SCSI commands over IP networks. An iSCSI network consists of one or more iSCSI storage units (targets) connected through a copper or optical networking cable to 10GbE network switches and IP routers. One or more servers are connected to this network, which are responsible for transferring data to or from the storage units.

When an operating system receives a request, it generates the SCSI command and then sends an IP packet over an Ethernet connection. At the receiving end, the SCSI commands are separated from the request, and the SCSI commands and data are sent to the SCSI controller and then to the SCSI storage device. iSCSI also returns a response to the request using the same protocol.

Constructing a Basic iSCSI SAN

Three main components make up an iSCSI SAN:

- iSCSI initiator – The initiator allows a given machine to access the storage available in the iSCSI SAN. It requests all SCSI operations like read or write. An initiator is usually located on the host (server) side, either as hardware (iSCSI adapter) or software (iSCSI software initiator). To transport block (SCSI) commands over the IP network, an iSCSI driver must be installed on the iSCSI host. An iSCSI driver is included with the Emulex adapter. For more information on iSCSI initiators, see chapter 9., "Configuring and Managing the iSCSI Initiator with the iSCSISelect Utility," on page 101.
- iSCSI target – An iSCSI SAN has one or more iSCSI targets, which house and make available the storage used within the SAN. The iSCSI target is the storage device itself or an appliance that controls and serves volumes or virtual volumes. The target is the device that performs the SCSI command or bridges it to an attached storage device. iSCSI targets can be disks, RAID arrays, or FC fabrics. For additional information on iSCSI targets, see chapter 10., "Configuring and Managing iSCSI Targets with the iSCSISelect Utility," on page 113.
- Networking infrastructure – The networking infrastructure in an iSCSI SAN uses Ethernet transport. The configuration and complexity of the storage network depend on its intended function and the required capabilities.

Managing an iSCSI Session

To transmit information from an iSCSI initiator to an iSCSI target, the initiator must first establish a session with the target through an iSCSI login process. The login process:

- Starts a TCP/IP connection
- Verifies that the iSCSI initiator has access to the iSCSI target (authentication)
- Allows negotiation of various parameters

Logging into an iSCSI Session

An iSCSI session has two phases:

- Login phase – iSCSI parameters are negotiated using login requests and responses.
- Full featured phase – After authentication has occurred and operational parameters have been set, the initiator begins to perform SCSI I/Os.

Security

Because the iSCSI protocol operates in the Internet environment, security is critical. The iSCSI SAN uses the CHAP security method.

CHAP Authentication

CHAP is used to periodically verify the identity of the initiator by the target using a challenge and response mechanism. The challenge and response is established on the initial link and may be repeated at any time afterward. For CHAP to work, the target must know the initiator's secret key, and the initiator must correctly respond to the challenge.

Although the authentication is only one-way, you can negotiate CHAP in both directions for mutual authentication with the help of the same secret set.

Configuring Boot from SAN for iSCSI

This section provides instructions for configuring boot from SAN for iSCSI on various operating systems using the iSCSISelect utility. It also provides information on using the iSCSISelect utility to perform an MPIO boot configuration.

Setting Up Boot from SAN for iSCSI

In the iSCSI target configuration, you have the option of setting dual network paths to a single boot LUN.

Note: iSCSI must be enabled for the port before configuring a boot target.

Windows Server

To set up boot from SAN for iSCSI on Windows Server:

1. Log into the iSCSISelect utility by pressing **<Ctrl+S>** when prompted.
2. Use the iSCSISelect utility to log into a target from one adapter and configure it for boot. For more information, see chapter 9., "Configuring and Managing the iSCSI Initiator with the iSCSISelect Utility," on page 101 and chapter 10., "Configuring and Managing iSCSI Targets with the iSCSISelect Utility," on page 113.

   If the iSCSISelect utility is configured properly, a message during boot time indicates that the iSCSI disk was successfully connected.
3. Install a Windows Server operating system over the iSCSI LUN.

Linux and Citrix Servers

To set up boot from SAN for iSCSI on Linux or Citrix:

1. Log into the iSCSISelect utility by pressing **<Ctrl+S>** when prompted.
2. Use the iSCSISelect utility to log into a target from one adapter and configure it for boot. For more information, see chapter 9., "Configuring and Managing the iSCSI Initiator with the iSCSISelect Utility," on page 101 and chapter 10., "Configuring and Managing iSCSI Targets with the iSCSISelect Utility," on page 113.

   If the iSCSISelect utility is configured properly, a message during boot time indicates that the iSCSI disk was successfully connected.
3. Install a Linux operating system over the iSCSI LUN. For more information, see the *Emulex Driver for Linux User Manual*, which is available on the Emulex website. For iSCSI boot, you will need the following information:

   For RHEL operating systems:

   a. When running the vmlinuz command, include the **dd** parameter to indicate that a driver update will be done.
   b. When prompted for the type of device your installation involves, choose "Specialized Storage Devices".
   c. When prompted to select the drives on which you will install the operating system or any drives you want to automatically mount to the system, select the iSCSI target device on the "Other SAN Devices" tab.

   For SLES operating systems:

   a. Set withiscsi=1 to indicate that a driver update will be done.
   b. When prompted, click **Configure iSCSI Disks** to perform target login.

   Note: You may need to run certain iscsiadm commands to load the disk after the iSCSI driver is installed. See the iscsiadm documentation for additional information.

ESXi Server

To install and configure boot from SAN on ESXi Server:

1. Log into the iSCSISelect utility pressing **<Ctrl+S>** when prompted.
2. Use the iSCSISelect utility to log into a target from one adapter and configure it for boot. For more information, see chapter 9., "Configuring and Managing the iSCSI Initiator with the iSCSISelect Utility," on page 101 and chapter 10., "Configuring and Managing iSCSI Targets with the iSCSISelect Utility," on page 113.

   If the iSCSISelect utility is configured properly, a message during boot time indicates that the iSCSI disk was successfully connected.
3. Install an ESXi Server operating system over the iSCSI LUN. For more information, see the *Emulex Driver for VMware User Manual*, which is available on the Emulex website.

Booting from SAN for iSCSI MPIO

MPIO support allows the initiator to log in dual sessions to the same target. In this way I/O can be sent over either TCP/IP connection to the target. If one session fails another session can continue processing I/O without interrupting the application. In iSCSI target configuration, you have the option of setting dual network paths to a single boot LUN.

Note: Although MPIO boot support allows the initiator to log into multiple sessions, the iSCSI BIOS currently limits the number of sessions to two iSCSI sessions for a single boot LUN.

Windows Server

To install and configure MPIO on Windows Server:

1. Log into the iSCSISelect utility by pressing **<Ctrl+S>** when prompted.
2. Use the iSCSISelect utility to log into a target from one adapter and configure it for boot by following the steps in "Setting Up a Basic iSCSI Boot Configuration" on page 98.

   If the iSCSISelect utility is configured properly, a message during boot time indicates that the iSCSI disk was successfully connected.

   Note: Only one instance of the boot LUN must be visible to the server during the installation. The installation might fail if multiple instances of the boot LUN are available to the server. Emulex recommends that the Spanning Tree Protocol be disabled on any ports that are connected to Windows Server 2008, Windows Server 2008 R2, Windows Server 2012, or Windows Server 2012 R2 hosts booting using iSCSI. The Spanning Tree Protocol is used to calculate the best path between switches if there are multiple switches and multiple paths through the network.
3. Install a Windows Server operating system over the iSCSI LUN.

4. After Windows Server is installed, install the MPIO software (such as Microsoft iSCSI Initiator), and reboot the system.
5. After rebooting, ensure that the boot LUN is detected by the MPIO driver. This can be done by either of the following two methods:
   - For Windows Server 2008, Windows Server 2008 R2, Windows Server 2012, and Windows Server 2012 R2:
     - Look at the driver name for the disk device from Device Manager,

     -or-

     - Use the MPIO GUI to check for device ID `MS FT2005iSCSIBusType_0x9` under the MPIO Devices tab. The Disk Manager does not show duplicate disks.
6. Reboot the system and log into the iSCSISelect utility by pressing **<Ctrl+S>** when prompted.
7. You can now add an additional boot path with the iSCSISelect utility.

   To add an additional boot path to the same iSCSI LUN:

   a. Follow the steps for the "Windows Server" on page 74 to set up the second path.
   b. At the Add/Ping iSCSI Target menu, set a valid ISID Qualifier before adding the target. The ISID Qualifier can be any number up to 65535. For more information on when an ISID value must be changed, see "Booting from SAN for iSCSI MPIO" on page 75.
   c. After you have logged into the target, from the iSCSI Target Configuration menu, set the Boot Target option for the second target to **Yes**.
   d. Press **<F7>** to show the LUNs behind the target.
   e. Select the same LUN you chose for the initial boot LUN, then press **<F3>** to set it to bootable.
8. After Windows Server boots, the MPIO installs drivers on the second path and prompts for reboot. Reboot the server.

Linux and Citrix Servers

To install and configure MPIO on Linux or Citrix:

1. Log into the iSCSISelect utility by pressing **<Ctrl+S>** when prompted.
2. Use the iSCSISelect utility to log into a target from one adapter and configure it for boot by following the steps for the "Linux and Citrix Servers" on page 74.
3. After Linux is installed, install the MPIO software and reboot the system.
4. After rebooting, ensure that the boot LUN is detected by the MPIO driver. Perform either of the following steps:
   - To see if the multipath is running, type:

     ```
     # /sbin/multipath
     ```

     -or-

   - To see if the multipath daemon is running, type:

     ```
     # ps -aelf | grep multipathd
     ```

5. If multipath is running, you can view the current multipath topology by typing
   ```
   # /sbin/multipath -l
   ```
6. Reboot the system and log into the iSCSISelect utility by pressing **<Ctrl+S>** when prompted.
7. Use the iSCSISelect utility to add an additional boot path to the same iSCSI LUN. To do this, follow these steps:
   a. Follow the steps for the "Linux and Citrix Servers" on page 74 to set up the second path.
   b. When you get to the Add/Ping iSCSI Target menu, make sure you set a valid ISID Qualifier before adding the target. The ISID Qualifier can be any number up to 65535. For more information on when an ISID value must be changed, see "Booting from SAN for iSCSI MPIO" on page 75.
   c. After you have logged into the target, from the iSCSI Target Configuration menu, set the Boot Target option for the second target to **Yes**.
   d. Press **<F7>** to show the LUNs behind the target.
   e. Select the same LUN you chose for the initial boot LUN, then press **<F3>** to set it to bootable.
   f. Follow the instructions on the bottom of the menu screens until you are prompted to exit.
   g. Save your changes before you exit.
   h. Press **<Y>** to exit the iSCSISelect utility.
8. After Linux boots, the MPIO installs drivers on the second path and prompts you to reboot. Reboot the server.

ESXi Server

To install and configure MPIO on ESXi Server:

1. Log into the iSCSISelect utility by pressing **<Ctrl+S>** when prompted.
2. Use the iSCSISelect utility to log into a target from one adapter and configure it for boot by following the steps for "ESXi Server" on page 75.
3. After the ESXi server is installed, install the MPIO software and reboot the system. The ESXi Server is MPIO by default.
4. Use the iSCSISelect utility to add an additional boot path to the same iSCSI LUN. To do this, follow these steps:
   a. Follow the steps for the "ESXi Server" on page 75 to set up the second path.
   b. When you access the Add/Ping iSCSI Target menu, set a valid ISID Qualifier before adding the target. The ISID Qualifier can be any number up to 65535. For more information on when an ISID value must be changed, see "Booting from SAN for iSCSI MPIO" on page 75.
   c. After you have logged into the target, from the iSCSI Target Configuration menu, set the Boot Target option for the second target to **Yes**.
   d. Press **<F7>** to show the LUNs behind the target.
   e. Select the same LUN you chose for the initial boot LUN, then press **<F3>** to set it to bootable.

f. Follow the instructions on the bottom of the menu screens until you are prompted to exit.
g. Save your changes before you exit.
h. Press **<Y>** to exit the iSCSISelect utility.

After the ESXi Server boots, the MPIO installs drivers on the second path and prompts for a reboot.

5. Reboot the server.

6. Using the FCoE Boot BIOS Utility for x86 and x64 Architectures

Before using the FCoE BIOS utility, ensure that the boot code is loaded and enabled on the adapter as described in "Updating and Enabling Boot Code" on page 96.

Notes

- This section reflects the most recent release of the FCoE BIOS utility. Some selections may not be available if you are using an older version of the utility.
- After exiting the FCoE BIOS configuration utility, the system will reboot whether or not any changes have been made.

Navigating the FCoE BIOS Utility

Use the following methods to navigate the FCoE BIOS utility:

- Press the up and down arrows on the keyboard to move through and select menu options or configuration fields. If multiple adapters are listed, use the up and down arrows to scroll to the additional adapters.
- Press **<PageUp>** to scroll to the previous page.
- Press **<PageDn>** to scroll to the next page.
- Press **<Enter>** to select a menu option, to select a changed value, to select a row in a configuration screen, or to change a configuration default.
- Press **<Esc>** to go back to the previous menu.

Starting the FCoE BIOS Utility

Note: Links must be established before entering the FCoE BIOS utility; otherwise, you will receive an error message.

To start the FCoE BIOS utility:

1. Turn on the computer and press and hold down **<Alt>** or **<Ctrl>** and press **<E>** immediately (within five seconds) when the Emulex bootup message to start the FCoE BIOS utility is displayed. An adapter listing screen (Figure 6-1 on page 80) is displayed.

   Note: If the bootup message does not appear, you must enable x86 BootBIOS. For more information, see "Updating and Enabling Boot Code" on page 96.

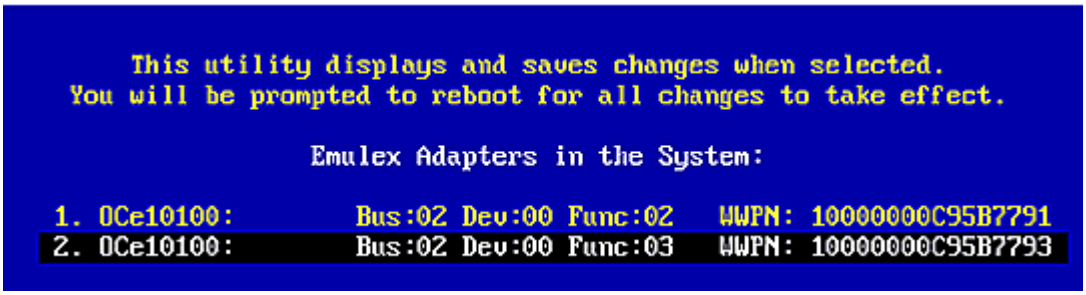
This utility displays and saves changes when selected.
You will be prompted to reboot for all changes to take effect.
Emulex Adapters in the System:
1. OCe10100: Bus:02 Dev:00 Func:02 WWPN: 10000000C95B7791
2. OCe10100: Bus:02 Dev:00 Func:03 WWPN: 10000000C95B7793

Figure 6-1 Emulex Adapter Listing Screen

2. Select the adapter to configure and press **<Enter>**. The main configuration screen (Figure 6-2 on page 80) is displayed.

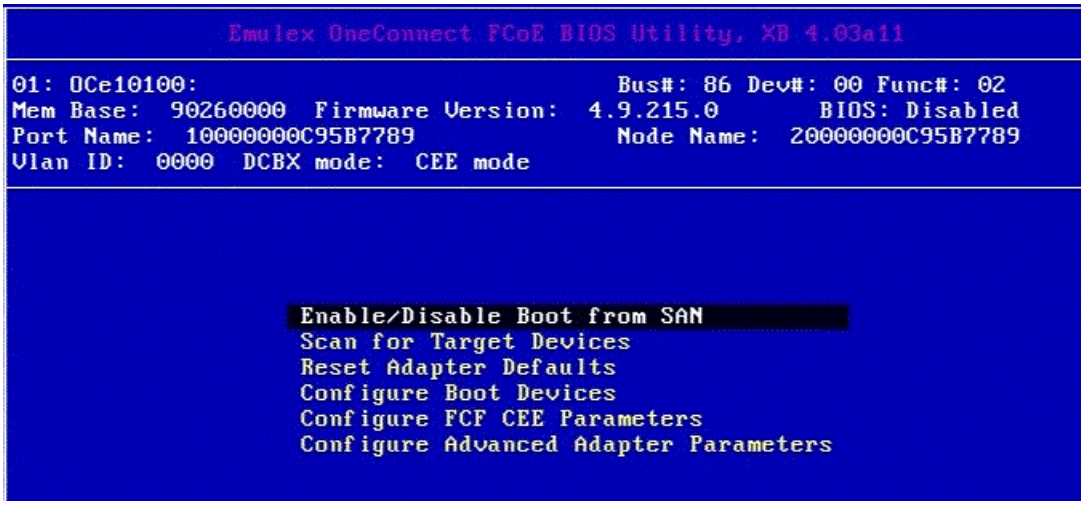
Emulex OneConnect FCoE BIOS Utility, XB 4.03a11
01: OCe10100: Bus#: 86 Dev#: 00 Func#: 02
Mem Base: 90260000 Firmware Version: 4.9.215.0 BIOS: Disabled
Port Name: 10000000C95B7789 Node Name: 20000000C95B7789
Vlan ID: 0000 DCBX mode: CEE mode
Enable/Disable Boot from SAN
Scan for Target Devices
Reset Adapter Defaults
Configure Boot Devices
Configure FCF CEE Parameters
Configure Advanced Adapter Parameters

Figure 6-2 Main Configuration Screen

Under normal circumstances, you would first configure boot devices using the FCoE BIOS utility. However, if the adapter is not enabled to boot from SAN, you must first enable the adapter to do so.

Enabling an Adapter to Boot from SAN

To enable an adapter to boot from SAN, from the main configuration screen (Figure 6-2 on page 80), select **Enable/Disable Boot from SAN** and press **<Enter>**.

Note: Adapters are disabled by default.

Boot from SAN must be enabled on one adapter in order to use remote boot functionality. After you enable an adapter, its boot status is displayed as shown in Figure 6-3, BIOS Status Screen, on page 81.

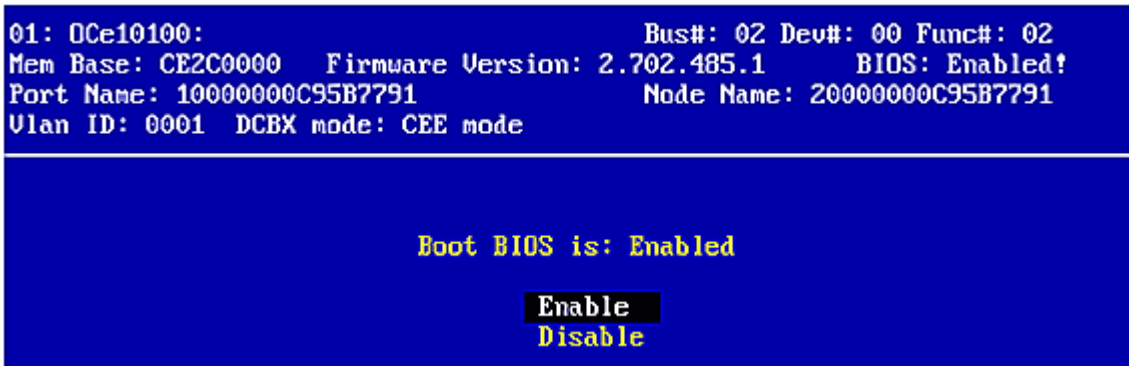
01: OCe10100: Bus#: 02 Dev#: 00 Func#: 02
Mem Base: CE2C0000 Firmware Version: 2.702.485.1 BIOS: Enabled!
Port Name: 10000000C95B7791 Node Name: 20000000C95B7791
Vlan ID: 0001 DCBX mode: CEE mode
Boot BIOS is: Enabled
Enable
Disable

Figure 6-3 BIOS Status Screen

Scanning for Target Devices

To scan for target devices:

1. From the main configuration screen (Figure 6-2 on page 80), select **Scan for Target Devices**. This option displays a list of discovered target devices (Figure 6-4 on page 81). It allows you to quickly verify zoning and SAN connectivity.

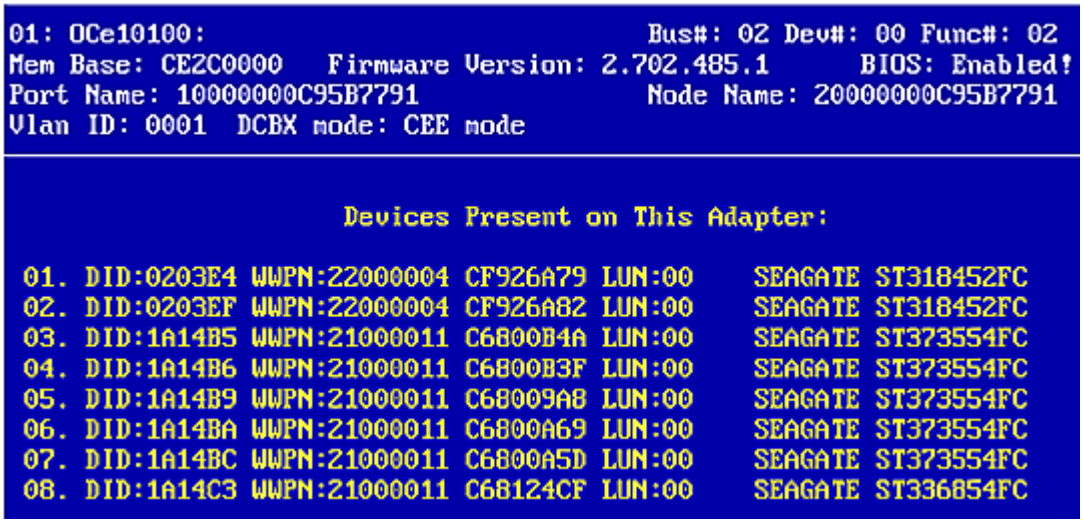
01: OCe10100: Bus#: 02 Dev#: 00 Func#: 02
Mem Base: CE2C0000 Firmware Version: 2.702.485.1 BIOS: Enabled!
Port Name: 10000000C95B7791 Node Name: 20000000C95B7791
Vlan ID: 0001 DCBX mode: CEE mode
Devices Present on This Adapter:
01. DID:0203E4 WWPN:22000004 CF926A79 LUN:00 SEAGATE ST318452FC
02. DID:0203EF WWPN:22000004 CF926A82 LUN:00 SEAGATE ST318452FC
03. DID:1A14B5 WWPN:21000011 C6800B4A LUN:00 SEAGATE ST373554FC
04. DID:1A14B6 WWPN:21000011 C6800B3F LUN:00 SEAGATE ST373554FC
05. DID:1A14B9 WWPN:21000011 C68009A8 LUN:00 SEAGATE ST373554FC
06. DID:1A14BA WWPN:21000011 C6800A69 LUN:00 SEAGATE ST373554FC
07. DID:1A14BC WWPN:21000011 C6800A5D LUN:00 SEAGATE ST373554FC
08. DID:1A14C3 WWPN:21000011 C68124CF LUN:00 SEAGATE ST336854FC

Figure 6-4 Devices Present on the Adapter Screen

2. Press **<Esc>** to return to the main configuration screen.

Configuring Boot Devices

To configure boot devices:

1. On the main configuration screen (Figure 6-2 on page 80), select **Configure Boot Devices** and press **<Enter>**.

   A list of eight boot devices is displayed (Figure 6-5 on page 82). The primary boot device is the first entry shown. It is the first bootable device. If the first boot entry fails, the system attempts to boot from the second bootable entry. If the second boot entry fails, the system attempts to boot from the third bootable entry and so on.

   Note: This assumes the system BIOS supports BBS and the boot order is set using the mapped drives from the list of saved boot devices.

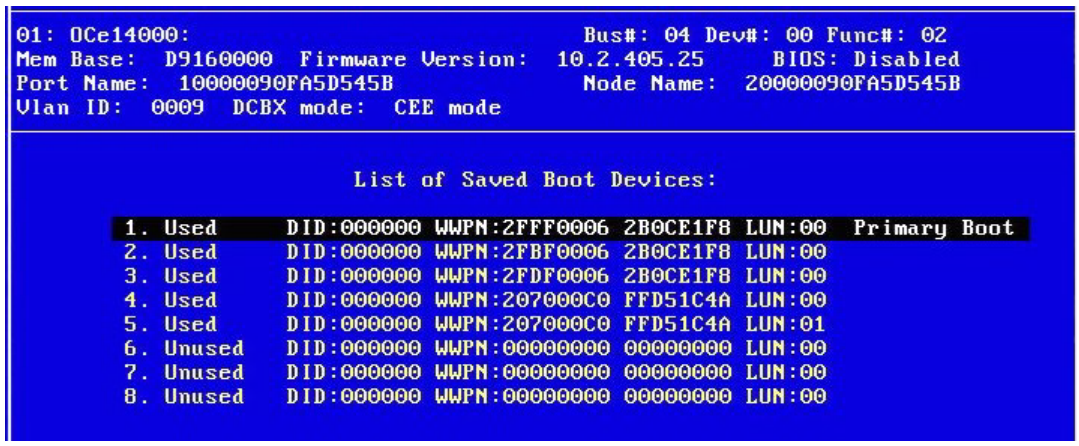
01: OCe14000: Bus#: 04 Dev#: 00 Func#: 02
Mem Base: D9160000 Firmware Version: 10.2.405.25 BIOS: Disabled
Port Name: 10000090FA5D545B Node Name: 20000090FA5D545B
Vlan ID: 0009 DCBX mode: CEE mode
List of Saved Boot Devices:
1. Used DID:000000 WWPN:2FFF0006 2B0CE1F8 LUN:00 Primary Boot
2. Used DID:000000 WWPN:2FBF0006 2B0CE1F8 LUN:00
3. Used DID:000000 WWPN:2FDF0006 2B0CE1F8 LUN:00
4. Used DID:000000 WWPN:207000C0 FFD51C4A LUN:00
5. Used DID:000000 WWPN:207000C0 FFD51C4A LUN:01
6. Unused DID:000000 WWPN:00000000 00000000 LUN:00
7. Unused DID:000000 WWPN:00000000 00000000 LUN:00
8. Unused DID:000000 WWPN:00000000 00000000 LUN:00

Figure 6-5 List of Saved Boot Devices Screen

2. Select a boot entry and press **<Enter>**. A screen similar to Figure 6-6 on page 82 is displayed.

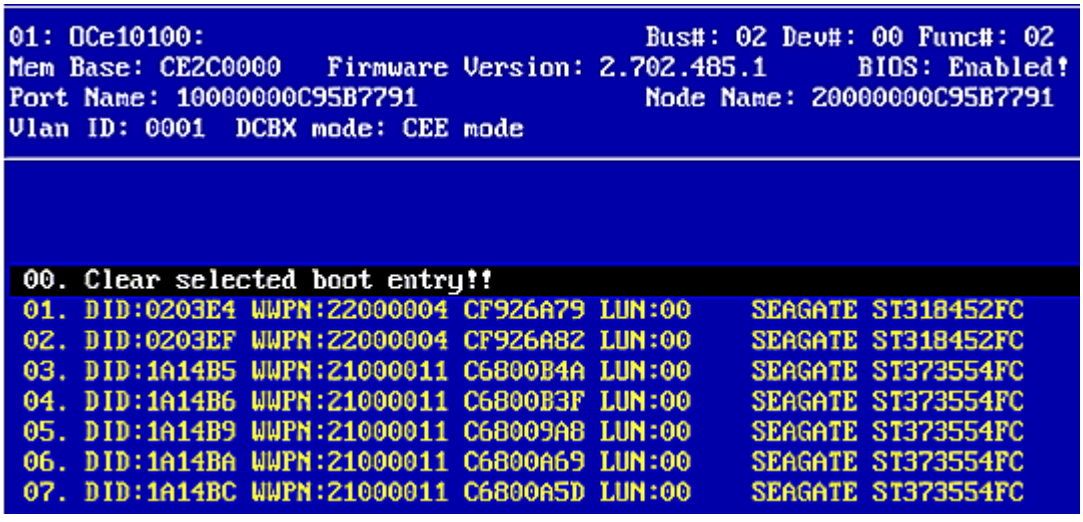
01: OCe10100: Bus#: 02 Dev#: 00 Func#: 02
Mem Base: CE2C0000 Firmware Version: 2.702.485.1 BIOS: Enabled!
Port Name: 10000000C95B7791 Node Name: 20000000C95B7791
Vlan ID: 0001 DCBX mode: CEE mode
00. Clear selected boot entry!!
01. DID:0203E4 WWPN:22000004 CF926A79 LUN:00 SEAGATE ST318452FC
02. DID:0203EF WWPN:22000004 CF926A8Z LUN:00 SEAGATE ST318452FC
03. DID:1A14B5 WWPN:21000011 C6800B4A LUN:00 SEAGATE ST373554FC
04. DID:1A14B6 WWPN:21000011 C6800B3F LUN:00 SEAGATE ST373554FC
05. DID:1A14B9 WWPN:21000011 C68009A8 LUN:00 SEAGATE ST373554FC
06. DID:1A14BA WWPN:21000011 C6800A69 LUN:00 SEAGATE ST373554FC
07. DID:1A14BC WWPN:21000011 C6800A5D LUN:00 SEAGATE ST373554FC

Figure 6-6 Device Selection List Example Screen

3. Select **<00>** and press **<Enter>** to clear the selected boot entry, or select the WWPN or DID of a device to configure and press **<Enter>**.
4. If you select a device, you are asked for the starting LUN. Use the up and down arrows to enter the starting LUN in hexadecimal format and press **<Enter>**. (Figure 6-7 on page 83). The starting LUN can be any number from 0 to 255.

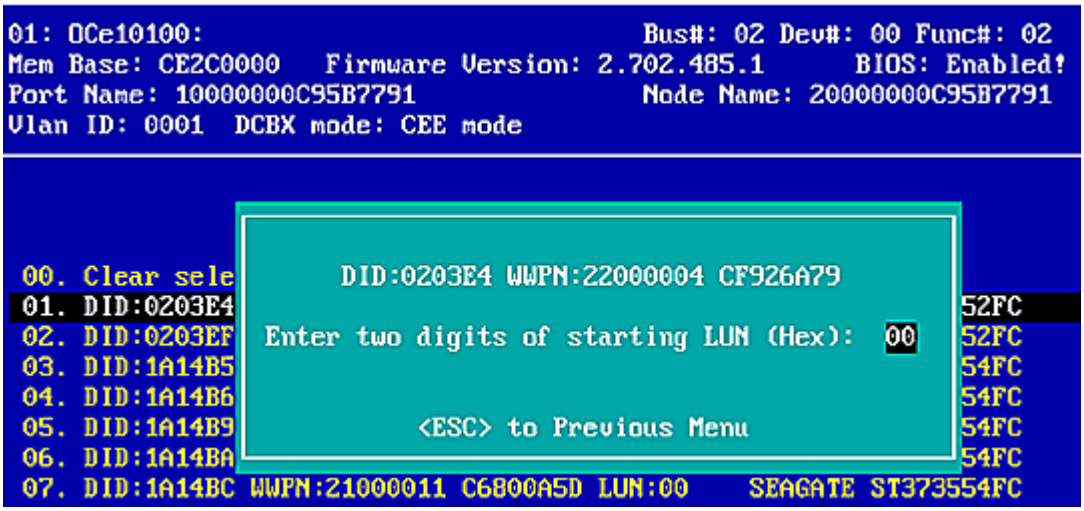

Figure 6-7 LUN Listing Screen

5. A screen similar to Figure 6-8 on page 83 is displayed. Press **<Enter>**.

01: OCe10100: Bus#: 02 Dev#: 00 Func#: 02
Mem Base: CE2C0000 Firmware Version: 2.702.435.1 BIOS: Enabled!
Port Name: 10000000C95B7595 Node Name: 20000000C95B7595
Vlan ID: 0001 DCBX mode: CEE mode
DID:0203E4 WWPN:22000004 CF926A79
01. LUN:00 SEAGATE ST318452FC 0004

Figure 6-8 Selected Boot Device Screen

The Boot Devices screen (Figure 6-9 on page 84) is displayed.

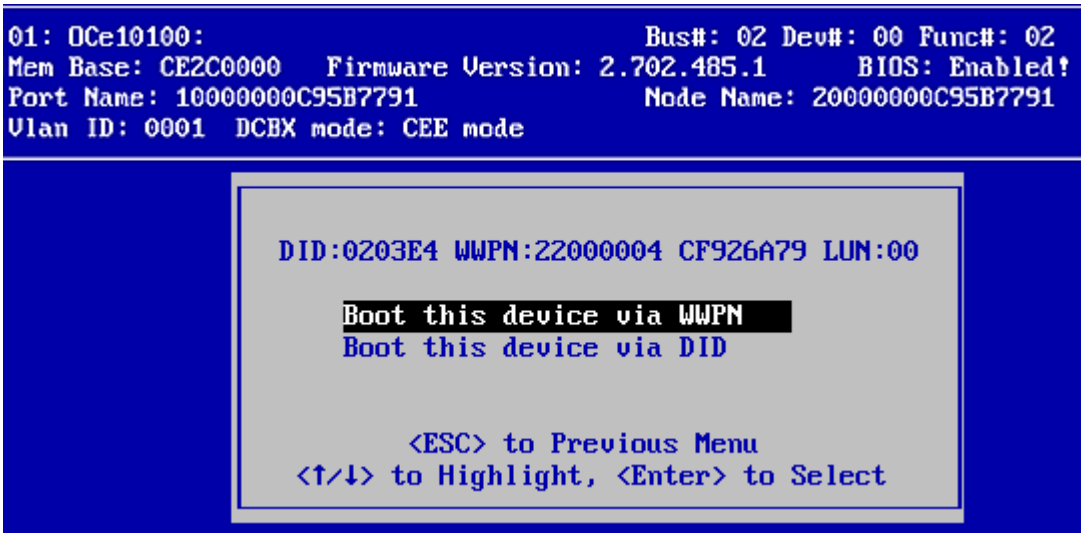

Figure 6-9 Boot Devices Screen

6. Use the up and down arrows to select the boot method. You can select to scan and boot from the device by its unique WWPN or by its FC DID (Figure 6-10 on page 84).

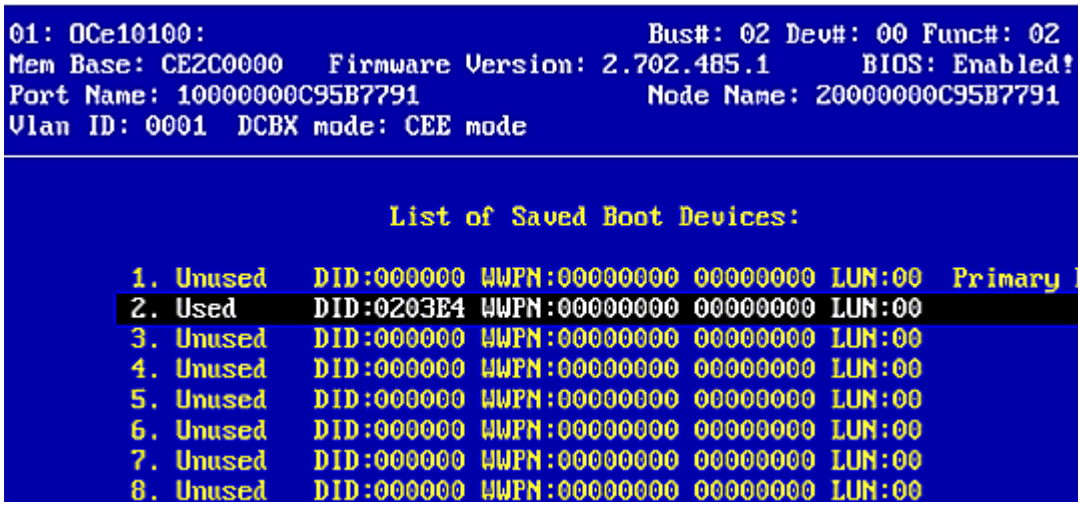

Figure 6-10 Primary Boot Device Set Up Screen

7. Press **<Enter>** to select the change.
8. Press **<Esc>** to return to the main configuration screen.
9. Reboot the system for the new boot path to take effect.

Configuring CEE Parameters

Note: For DCBX configuration, the adapter is always in CEE mode.

An FCF is the bridging layer to connect FCoE to an FC network. The FCF is usually built into the FCoE switch.

The FCF contains routing information including the switch name, fabric name, and VLAN information that is used to send the FCoE data to the correct FC fabric.

To configure CEE parameters:

1. If multiple VLANs or FCoE switches are set up and you want to select a particular VLAN to boot from every time, select **Configure FCF CEE Parameters** from the main configuration screen (Figure 6-2 on page 80) and press **<Enter>**. A list of discovered FCFs is displayed (Figure 6-11 on page 85).

Adapter Boot Configuration Record:
D VLAN ID: *Any* Sw Name: ***Match Any*** , Fab Name: ***Match Any***
Boot/Active/Del, <Pg Dn> FCF Sel, <TAB> Field Sel, <ENTER> Save, <ESC> Exit
Select the discovered FCF you wish to write into this Adapter Record:
1. VLAN ID: 0008, Sw Name: 80EF47EC-0D000920, Fab Name: 81EF47EC-0D000820

Figure 6-11 FCF Listing Screen

2. Select the FCF you want to boot from every time and save it to the adapter record by pressing **<Enter>**. The following message is displayed (Figure 6-12 on page 85).

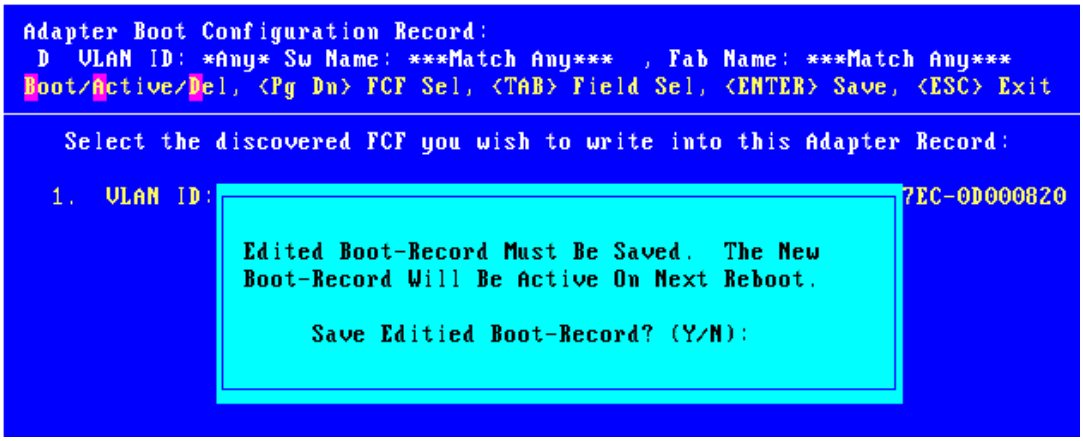
Adapter Boot Configuration Record:
D VLAN ID: *Any* Sw Name: ***Match Any*** , Fab Name: ***Match Any***
Boot/Active/Del, <Pg Dn> FCF Sel, <TAB> Field Sel, <ENTER> Save, <ESC> Exit
Select the discovered FCF you wish to write into this Adapter Record:
1. VLAN ID:
7EC-0D000820
Edited Boot-Record Must Be Saved. The New
Boot-Record Will Be Active On Next Reboot.
Save Edited Boot-Record? (Y/N):

Figure 6-12 Save Edited Boot Record Dialog Box

3. Type **<Y>** to save the boot record. The main configuration screen (Figure 6-2 on page 80) is displayed.

Configuring Advanced Adapter Parameters

The BIOS utility provides various options that can be modified to provide different behavior. Use the BIOS utility to perform the following tasks:

- Change the port login retry timer.
- Enable or disable spinup delay.
- Set autoscan.
- Enable or disable EDD 3.0.
- Enable or disable the start unit command.
- Enable or disable the environment variable.
- Enable or disable the auto boot sector.

To access the adapter configuration menu, from the main configuration screen (Figure 6-2 on page 80), select **Configure Advanced Adapter Parameters** and press **<Enter>**. The adapter configuration screen (Figure 6-13 on page 86) is displayed.

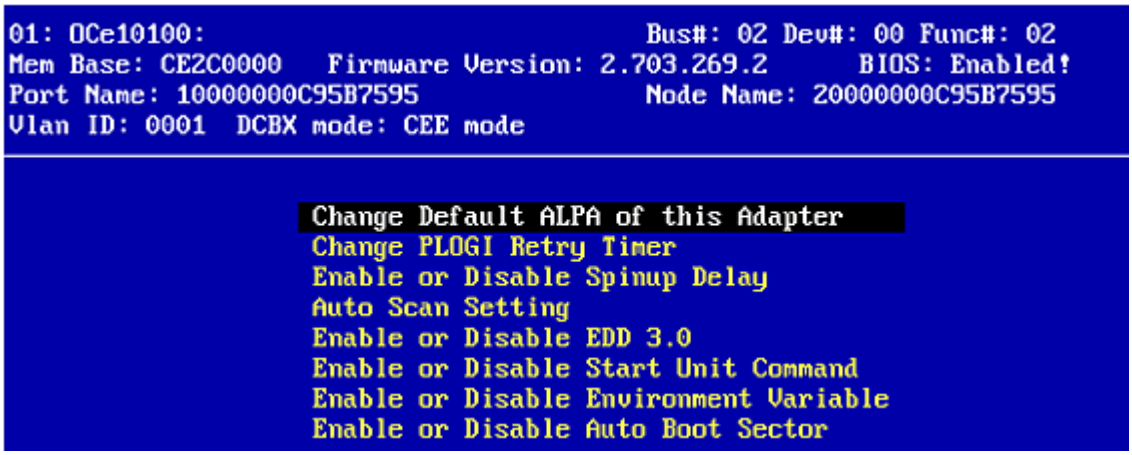
01: OCe10100: Bus#: 02 Dev#: 00 Func#: 02
Mem Base: CE2C0000 Firmware Version: 2.703.269.2 BIOS: Enabled!
Port Name: 10000000C95B7595 Node Name: 20000000C95B7595
Vlan ID: 0001 DCBX mode: CEE mode
Change Default ALPA of this Adapter
Change PLOGI Retry Timer
Enable or Disable Spinup Delay
Auto Scan Setting
Enable or Disable EDD 3.0
Enable or Disable Start Unit Command
Enable or Disable Environment Variable
Enable or Disable Auto Boot Sector

Figure 6-13 Advanced Adapter Configuration Menu

Default settings are acceptable for most installations.

To reset all values to their defaults, from the main configuration screen (Figure 6-2 on page 80), select **Reset Adapter Defaults** and press **<Enter>**.

Changing the Default AL_PA

The default value of the AL_PA for the adapter BIOS is 00 (hexadecimal). All adapters or boot drives can be configured to other AL_PAs rather than their default values.

Note: This option applies to arbitrated loop (FC-AL) only. The FCoE protocol does not support FC-AL.

To change the default AL_PA:

1. On the main configuration screen (Figure 6-2 on page 80), select **Configure Advanced Adapter Parameters** and press **<Enter>**. The adapter configuration screen (Figure 6-13 on page 86) is displayed.

2. Select **Change Default ALPA** of this adapter and press **<Enter>**. Information is displayed similar to Figure 6-14 on page 87.

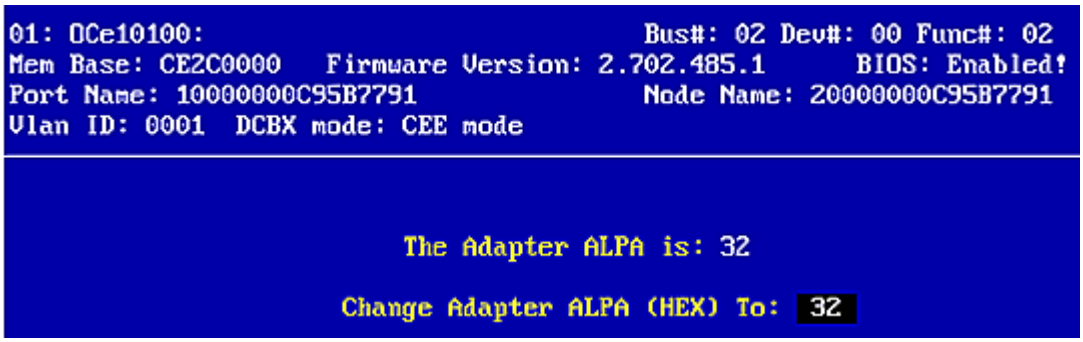
01: OCe10100: Bus#: 02 Dev#: 00 Func#: 02
Mem Base: CE2C0000 Firmware Version: 2.702.485.1 BIOS: Enabled!
Port Name: 10000000C95B7791 Node Name: 20000000C95B7791
Vlan ID: 0001 DCBX mode: CEE mode
The Adapter ALPA is: 32
Change Adapter ALPA (HEX) To: 32

Figure 6-14 Change Default ALPA Screen

3. To change the default AL_PA, use the up and down arrow keys to scroll through the valid AL_PAs. Table 6-1 on page 87 lists the valid AL_PA values.
4. Press **<Enter>** to accept the new value.
5. Press **<Esc>** to return to the advanced adapter configuration menu.
6. For changes to take effect, reboot the system.

Note: If the adapter's AL_PA is changed, it does not appear on the NVRAM AL_PA until the system has been reset.

Table 6-1 Valid AL_PA Values

0x00	0x01	0x02	0x04	0x08	0x0F	0x10	0x17
0x18	0x1B	0x1D	0x1E	0x1F	0x23	0x25	0x26
0x27	0x29	0x2A	0x2B	0x2C	0x2D	0x2E	0x31
0x32	0x33	0x34	0x35	0x36	0x39	0x3A	0x3C
0x43	0x45	0x46	0x47	0x49	0x4A	0x4B	0x4C
0x4D	0x4E	0x51	0x52	0x53	0x54	0x55	0x56
0x59	0x5A	0x5C	0x63	0x65	0x66	0x67	0x69
0x6A	0x6B	0x6C	0x6D	0x6E	0x71	0x72	0x73
0x74	0x75	0x76	0x79	0x7A	0x7C	0x80	0x81
0x82	0x84	0x88	0x8F	0x90	0x97	0x98	0x9B
0x9D	0x9E	0x9F	0xA3	0xA5	0xA6	0xA7	0xA9
0xAA	0xAB	0xAC	0xAD	0xAE	0xB1	0xB2	0xB3
0xB4	0xB5	0xB6	0xB9	0xBA	0xBC	0xC3	0xC5
0xC6	0xC7	0xC9	0xCA	0xCB	0xCC	0xCD	0xCE
0xD1	0xD2	0xD3	0xD4	0xD5	0xD6	0xD9	0xDA
0xDC	0xE0	0xE1	0xE2	0xE4	0xE8	0xEF	

Changing the Port Login Retry Timer

This option is especially useful for Tachyon-based RAID arrays. Rarely, a Tachyon-based RAID array resets itself and the port goes offline temporarily. When the port returns to operation, the port login scans the loop to discover the device. The port login retry interval is the time it takes for one port login to scan the whole loop. You can choose:

- No Port Login Retry: 0 msec – default
- 50 msec takes 5 to 6 seconds per device (if 126 AL_PAs are on the loop)
- 100 msec takes 12 seconds per device (if 126 AL_PAs are on the loop)
- 200 msec takes 22 seconds per device (if 126 AL_PAs are on the loop)

To set the interval for the port login retry timer:

1. On the main configuration screen (Figure 6-2 on page 80), select **Configure Advanced Adapter Parameters** and press **<Enter>**. The adapter configuration screen (Figure 6-13 on page 86) is displayed.
2. Select **Change PLOGI Retry Timer** and press **<Enter>**. Information is displayed similar to Figure 6-15 on page 88.

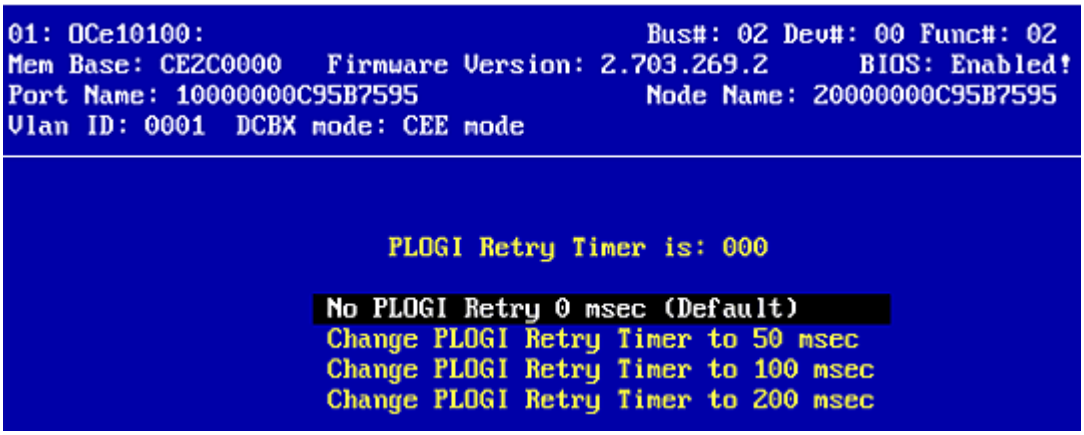
01: OCe10100: Bus#: 02 Dev#: 00 Func#: 02
Mem Base: CE2C0000 Firmware Version: 2.703.269.2 BIOS: Enabled!
Port Name: 10000000C95B7595 Node Name: 20000000C95B7595
Vlan ID: 0001 DCBX mode: CEE mode
PLOGI Retry Timer is: 000
No PLOGI Retry 0 msec (Default)
Change PLOGI Retry Timer to 50 msec
Change PLOGI Retry Timer to 100 msec
Change PLOGI Retry Timer to 200 msec

Figure 6-15 Change the Port Login Retry Timer Screen

3. Select the retry timer interval.
4. Press **<Enter>** to accept the new interval.
5. Press **<Esc>** to return to the advanced adapter configuration screen.
6. For changes to take effect, reboot the system.

Enabling or Disabling the Spinup Delay

This option allows you to enable or disable the disk spinup delay. The factory default setting is disabled.

If at least one boot device has been defined, and the spinup delay is enabled, the boot BIOS searches for the first available boot device.

- If a boot device is present, the boot BIOS boots from it immediately.
- If a boot device is not ready, the boot BIOS waits for the spinup delay and, for up to three additional minutes, continues the boot scanning algorithm to find another multi-boot device.

If boot devices have not been defined and auto scan is enabled, then the boot BIOS waits for five minutes before scanning for devices.

- In an attached fabric, the boot BIOS attempts to boot from the first target found in the NameServer data.

To enable or disable the spinup delay:

1. On the main configuration screen (Figure 6-2 on page 80), select **Configure Advanced Adapter Parameters** and press **<Enter>**. The adapter configuration screen (Figure 6-13 on page 86) is displayed.
2. Select **Enable or Disable Spinup Delay** and press **<Enter>**. Information is displayed similar to Figure 6-16 on page 89.

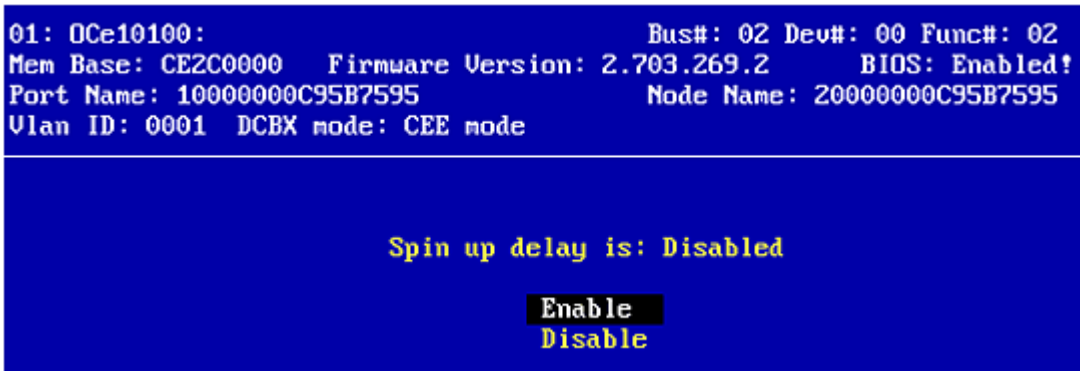
01: OCe10100: Bus#: 02 Dev#: 00 Func#: 02
Mem Base: CE2C0000 Firmware Version: 2.703.269.2 BIOS: Enabled!
Port Name: 10000000C95B7595 Node Name: 20000000C95B7595
Vlan ID: 0001 DCBX mode: CEE mode
Spin up delay is: Disabled
Enable
Disable

Figure 6-16 Enable or Disable Spinup Delay Screen

3. Select whether to enable or disable spinup delay.
4. Press **<Enter>** to accept the new value.
5. Press **<Esc>** to return to the advanced adapter configuration menu.
6. For changes to take effect, reboot the system.

Setting Auto Scan

This option allows you to set auto scan. Auto scan is available only if none of the eight boot entries is configured. The factory default is disabled. If there is more than one adapter with the same PCI Bus number in the system, and each has a boot drive attached, the first PCI-scanned adapter is the boot adapter.

This option allows you to enable or disable the auto scan feature. Auto scan is available only when all eight boot entries are unused (empty). The factory default for auto scan is disabled. Auto scan allows you to boot from the first boot device found in the FC fabric with the following options:

- Autoscan disabled – default
- Any first device – the first adapter scans the fabric and the first disk discovered becomes the attempted boot device
- First LUN 0 device – the first device discovered with LUN 0
- First NOT LUN 0 device – the first device discovered with a LUN other than 0

To set auto scan:

1. From the main configuration screen (Figure 6-2 on page 80), select **Configure Advanced Adapter Parameters** and press **<Enter>**. The adapter configuration screen (Figure 6-13 on page 86) is displayed.
2. Select **Auto Scan Setting** and press **<Enter>**. The Set Auto Scan screen (Figure 6-17 on page 90) is displayed.

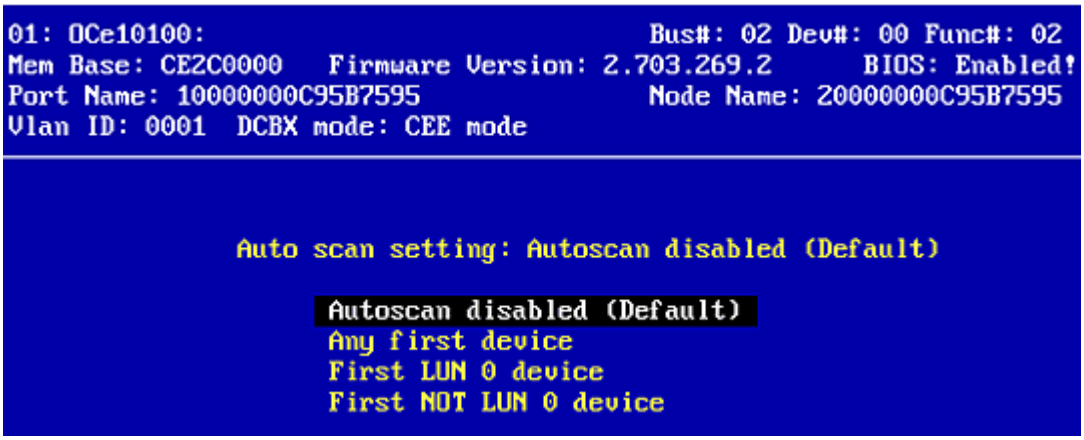
01: OCe10100: Bus#: 02 Dev#: 00 Func#: 02
Mem Base: CE2C0000 Firmware Version: 2.703.269.2 BIOS: Enabled!
Port Name: 10000000C95B7595 Node Name: 20000000C95B7595
Vlan ID: 0001 DCBX mode: CEE mode
Auto scan setting: Autoscan disabled (Default)
Autoscan disabled (Default)
Any first device
First LUN 0 device
First NOT LUN 0 device

Figure 6-17 Set Auto Scan Screen

3. Select the appropriate auto scan option.
4. Press **<Enter>** to accept the new scan option.
5. Press **<Esc>** to return to the advanced adapter configuration screen.
6. For changes to take effect, reboot the system.

Enabling or Disabling EDD 3.0

EDD 3.0 provides additional data to the operating system boot loader during an INT-13h function 48h call (get device parameters). This information includes the path to the boot device and the disk size. The default setting for EDD 3.0 is enabled. If EDD 3.0 is disabled, the setting reverts to EDD 2.1.

To enable or disable EDD 3.0:

1. From the main configuration screen (Figure 6-2 on page 80), select **Configure Advanced Adapter Parameters** and press **<Enter>**. The adapter configuration screen (Figure 6-13 on page 86) is displayed.
2. Select **Enable or Disable EDD 3.0** and press **<Enter>**. The EDD 3.0 configuration screen (Figure 6-18 on page 91) is displayed.

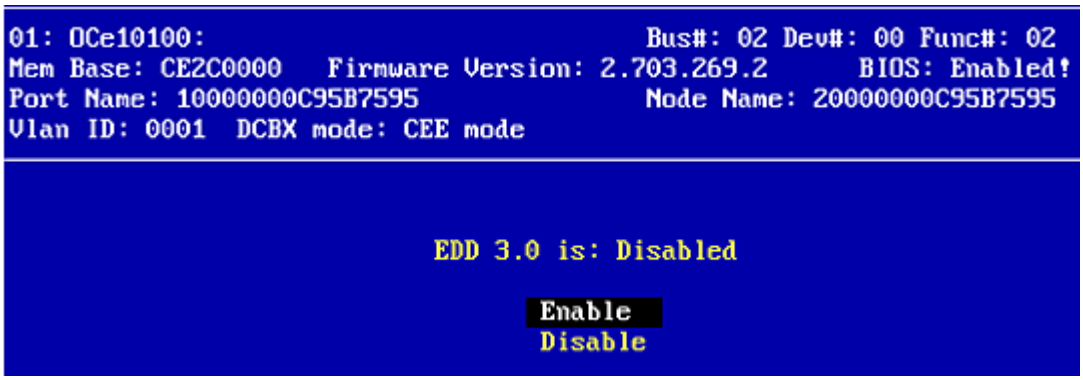
01: OCe10100: Bus#: 02 Dev#: 00 Func#: 02
Mem Base: CE2C0000 Firmware Version: 2.703.269.2 BIOS: Enabled!
Port Name: 10000000C95B7595 Node Name: 20000000C95B7595
Vlan ID: 0001 DCBX mode: CEE mode
EDD 3.0 is: Disabled
Enable
Disable

Figure 6-18 Enable or Disable EDD 3.0 Screen

3. Select whether to enable or disable EDD 3.0.
4. Press **<Enter>** to accept the change.
5. Press **<Esc>** to return to the advanced adapter configuration menu.
6. For changes to take effect, reboot the system.

Enabling or Disabling the Start Unit Command

You must know the specific LUN to issue the SCSI start unit command. The default setting is disabled.

To enable or disable the start unit command:

1. From the main configuration screen (Figure 6-2 on page 80), select **Configure Advanced Adapter Parameters** and press **<Enter>**. The adapter configuration screen (Figure 6-13 on page 86) is displayed.
2. Select **Enable or Disable Start Unit Command** and press **<Enter>**. The Start Unit Command configuration screen (Figure 6-19 on page 92) is displayed.

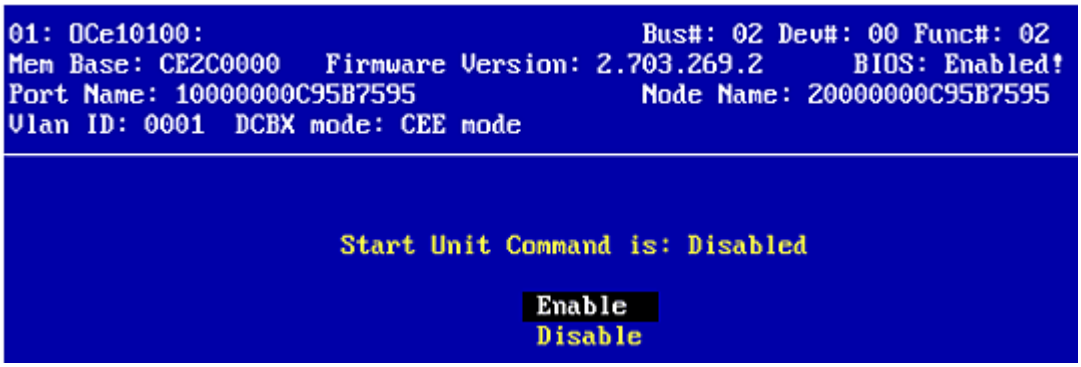
01: OCe10100: Bus#: 02 Dev#: 00 Func#: 02
Mem Base: CE2C0000 Firmware Version: 2.703.269.2 BIOS: Enabled!
Port Name: 10000000C95B7595 Node Name: 20000000C95B7595
Vlan ID: 0001 DCBX mode: CEE mode
Start Unit Command is: Disabled
Enable
Disable

Figure 6-19 Enable or Disable Start Unit Command Screen

3. Select whether to enable or disable the start unit command.
4. Press **<Enter>** to select the change.
5. Press **<Esc>** to return to the advanced adapter configuration screen.
6. For changes to take effect, reboot the system.

Enabling or Disabling the Environment Variable

Sets the boot adapter order if the system supports the environment variable. The default setting is disabled.

To enable or disable the environment variable:

1. From the main configuration screen (Figure 6-2 on page 80), select **Configure Advanced Adapter Parameters** and press **<Enter>**. The adapter configuration screen (Figure 6-13 on page 86) is displayed.
2. Select **Enable or Disable Environment Variable** and press **<Enter>**. The Environment Variable configuration screen (Figure 6-20 on page 92) is displayed.

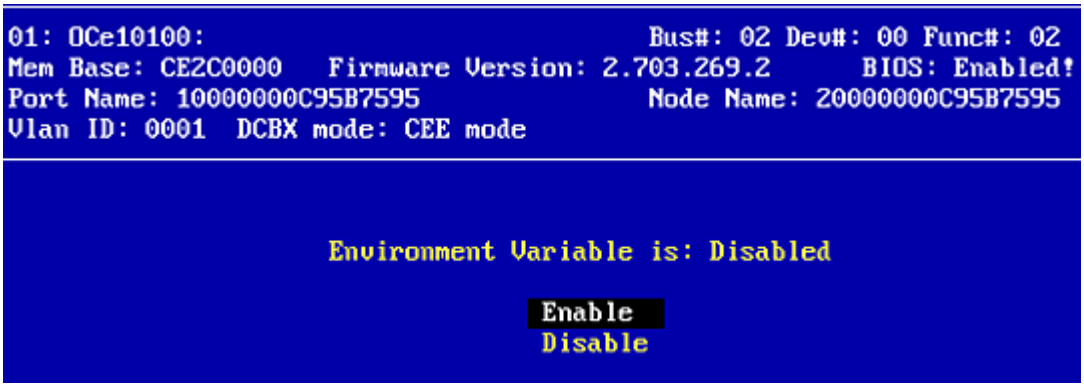
01: OCe10100: Bus#: 02 Dev#: 00 Func#: 02
Mem Base: CE2C0000 Firmware Version: 2.703.269.2 BIOS: Enabled!
Port Name: 10000000C95B7595 Node Name: 20000000C95B7595
Vlan ID: 0001 DCBX mode: CEE mode
Environment Variable is: Disabled
Enable
Disable

Figure 6-20 Enable or Disable Environment Variable Screen

3. Select whether to enable or disable the environment variable.
4. Press **<Enter>** to select the change.
5. Press **<Esc>** to return to the advanced adapter configuration screen.
6. For changes to take effect, reboot the system.

Enabling or Disabling Auto Boot Sector

This option automatically defines the boot sector of the target disk for the migration boot process, which applies to HP MSA1000 arrays only. If there is no partition on the target, the default boot sector format is 63 sectors. The default setting is disabled.

To enable or disable the auto boot sector format:

1. From the main configuration screen (Figure 6-2 on page 80), select **Configure Advanced Adapter Parameters** and press **<Enter>**. The adapter configuration screen (Figure 6-13 on page 86) is displayed.
2. Select **Enable or Disable Auto Boot Sector** and press **<Enter>**. The Auto Boot Sector configuration screen (Figure 6-21 on page 93) is displayed.

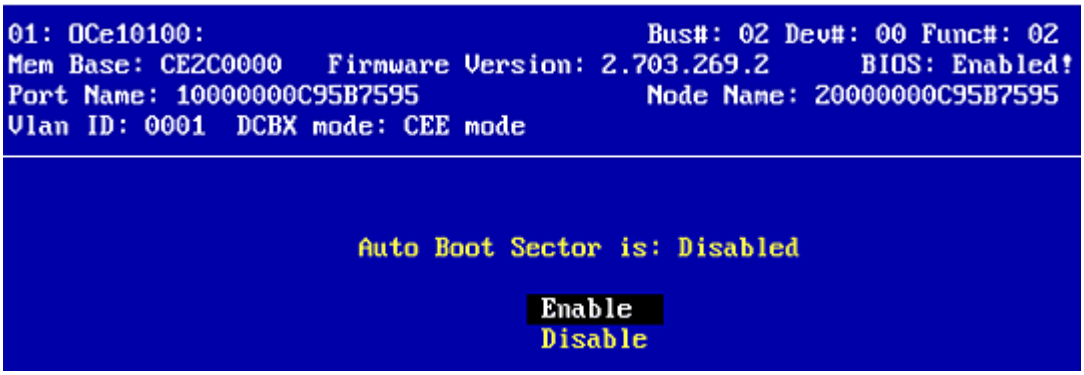
01: OCe10100: Bus#: 02 Dev#: 00 Func#: 02
Mem Base: CE2C0000 Firmware Version: 2.703.269.2 BIOS: Enabled!
Port Name: 10000000C95B7595 Node Name: 20000000C95B7595
Vlan ID: 0001 DCBX mode: CEE mode
Auto Boot Sector is: Disabled
Enable
Disable

Figure 6-21 Enable or Disable Auto Boot Sector Format Screen

3. Select whether to enable or disable the auto boot sector.
4. Press **<Enter>** to accept the new value.
5. Press **<Esc>** to return to the advanced adapter configuration screen.
6. For changes to take effect, reboot the system.

Using Multi-Path Boot from SAN

Multi-boot BIOS is in compliance with BBS. The system must have a multi-boot system BIOS in order to take advantage of this option. The multi-boot BIOS allows you to select any boot disk in the system BIOS setup menu. The boot disk can be an FC drive, a SCSI drive, an IDE drive, a USB device, or a floppy drive. The Emulex BIOS supplies the first eight drives to the system BIOS menu. The multi-boot BIOS can override the FC drive that is selected in the BIOS utility.

For example, the system has eight FC disks only. The boot disk has DID 0203E4. However, you can select DID 1A14B5 in the system BIOS setup menu. The boot device is the FC disk with DID 1A14B5 instead of DID 0203E4, as is set in the BIOS utility.

If the system supports multi-boot BBS, the local boot disk (drive C) is the first entry in multi-boot on the system BIOS setup menu. The list of entries is determined by the list of configured boot entries in the BIOS utility. For example:

```
Adapter 1: boot_entry0, boot_entry1
Adapter 2: boot_entry2, boot_entry3
```

The order of boot entries exported to multi-boot (BBS) is

```
boot_entry0, boot_entry1, boot_entry2, and boot_entry3.
```

However, multi-boot allows changing the boot order in the server BIOS, which allows any disk to become the C drive.

Resetting to Default Values

The BIOS utility enables you to reset BIOS boot parameters to their factory default settings. These defaults are listed in Table 6-2.

Note: Any configured CEE (FCF) parameters are not cleared out. Only boot adapter specific information is cleared out.

Table 6-2 Default Adapter Boot Parameter Values

Parameter	Default Value	Valid Values
Boot from SAN	Disabled	Enabled Disabled
EDD 3.0	Enabled (EDD 3.0)	Enabled (EDD 3.0) Disabled (EDD 2.1)
Port Login Retry Timer	Disabled	Disabled 50 msec 100 msec 200 msec
Spinup Delay	Disabled	Enabled Disabled
Auto Scan	Disabled	Enabled Disabled
Start Unit	Disabled	Enabled Disabled
Environmental Variable	Disabled	Enabled Disabled
Auto Boot Sector	Disabled	Enabled Disabled

To reset parameters to their factory default settings:

1. On the main configuration screen (Figure 6-2 on page 80), select **Reset Adapter Defaults** and press **<Enter>**. A message (Figure 6-22 on page 95) asks if you want to reset to the defaults.

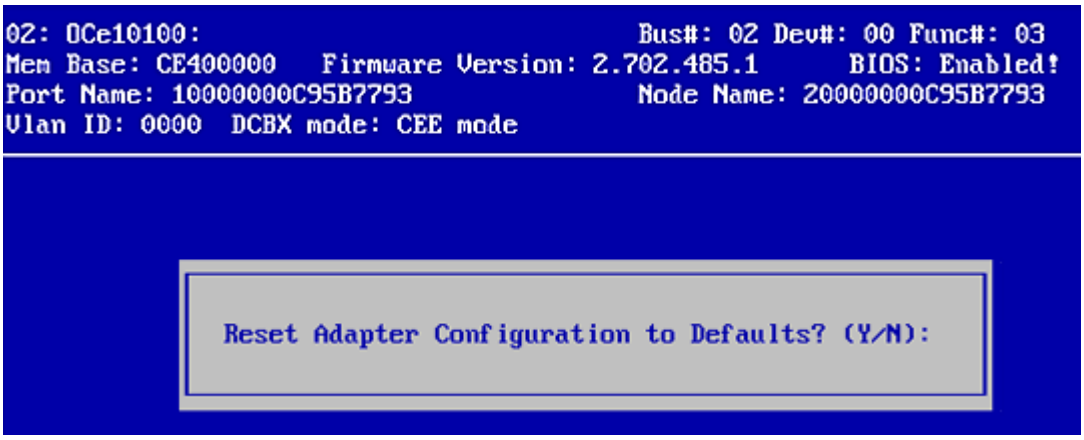
02: OCe10100: Bus#: 02 Dev#: 00 Func#: 03
Mem Base: CE400000 Firmware Version: 2.702.485.1 BIOS: Enabled!
Port Name: 10000000C95B7793 Node Name: 20000000C95B7793
Vlan ID: 0000 DCBX mode: CEE mode
Reset Adapter Configuration to Defaults? (Y/N):

Figure 6-22 Reset Adapter Configuration to Defaults Screen

2. Press **<Y>**. All settings revert to their factory default values.
3. Press **<Esc>** to go to the previous screen.

7. Updating and Enabling Boot Code

Emulex provides utilities to update and enable boot code. The utility that you use depends on the operating system and, in some cases, the driver type or system architecture. Table 7-1 indicates the utilities that are currently available for each operating system.

Table 7-1 Utilities that Update and Enable Boot Code

Utilities	Windows	Linux[1]	VMware[2]	Solaris
OneCommand Manager GUI	✓	✓	✓	✓
OneCommand Manager CLI	✓	✓	✓	✓
Offline Utilities	✓	✓		
UEFI Utilities	✓	✓	✓	
OneCommand Manager plug-in for VMware vCenter Server			✓	
OneConnect Flash Utility[3]	✓	✓	✓	✓
CIM Provider			✓	
ethtool[4]		✓		
FCA emlxadm Utility				✓

1) For the Citrix operating systems, the OneCommand Manager application CLI is not supported locally, but can be managed using a remote system. The OneCommand Manager GUI application is not supported.
2) For VMware operating systems, the OneCommand Manager application GUI and CLI are not supported locally, but can be run remotely using a Windows system.
3) Supported only on OneConnect adapters; not supported on IA64–based servers.
4) Supported only on Ethernet adapters.

After you decide which utility to use, see the appropriate documentation for the proper procedures:

- OneCommand Manager application: see the *OneCommand Manager Application User Manual*, the *OneCommand Manager Command Line Interface User Manual*, or the *OneCommand Manager for VMware vCenter User Manual*
- Offline utilities: see the *Offline and Online Adapter Management Utilities User Manual*
- UEFI utilities: see
  - chapter 11., "Configuring UEFI for Ethernet," on page 127
  - chapter 12., "Configuring UEFI for iSCSI," on page 167
  - chapter 13., "Configuring UEFI for FCoE," on page 194
- OneCommand Manager plug-in for VMware vCenter Server: see the *OneCommand Manager for VMware vCenter User Manual*
- OneConnect Flash Utility: see the *Using the OneConnect Flash Utility to Update OneConnect Adapter Firmware* guide

- CIM Provider: see the *CIM Provider Package Installation Guide*
- ethtool: see the *Emulex Drivers for Linux User Manual*
- FCA emlxadm utility: see the *FCA Utilities for Solaris User Manual*

8. Configuring iSCSI Boot Support with the iSCSISelect Utility

This section provides quick installation instructions for setting up a basic boot configuration. For more information on setting up an iSCSI initiator and adding an iSCSI target, see chapter 9., "Configuring and Managing the iSCSI Initiator with the iSCSISelect Utility," on page 101 and chapter 10., "Configuring and Managing iSCSI Targets with the iSCSISelect Utility," on page 113.

Navigating the iSCSISelect Utility

Use the following methods to navigate the iSCSISelect utility:

- Press the up and down arrows on the keyboard to move through and select menu options or configuration fields. If multiple adapters are listed, use the up and down arrows to scroll to the additional adapters.
- Press **<Tab>** to move to the next field, and **<Shift> <Tab>** to move to the previous field.
- Press **<Enter>** to accept a selection, select a menu option, to select a row in a configuration screen, or to change a configuration default.
- Press **<Esc>** to return to the previous menu or page, cancel a selection or dialog box, or exit the utility.

Setting Up a Basic iSCSI Boot Configuration

By setting up a basic iSCSI boot configuration, you can configure the initiator, contact network devices, and set up an iSCSI boot target. With iSCSI boot capability, the iSCSISelect utility can quickly and easily provide the target LUN disk to the operating system through the BIOS. After setting up a basic iSCSI boot configuration, you can continue to use the iSCSISelect utility to manage the OneConnect server iSCSI SAN environment.

When setting up a basic iSCSI boot configuration you must do the following:

- Configure the iSCSI initiator name and enable boot support
- Configure the network properties
- Add an iSCSI target and enable it as a boot target
- Set the boot LUN
- Reboot the system

To set up a basic iSCSI boot configuration:

1. Log into the iSCSISelect utility by pressing **<Ctrl+S>** when prompted.
2. From the iSCSI Initiator Configuration screen (Figure 8-1 on page 99), set the initiator name.

3. Select **Save** and press **<Enter>** to save the initiator name.

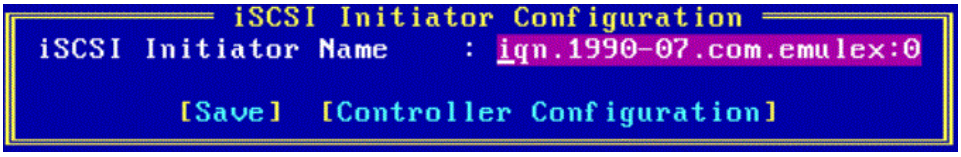

Figure 8-1 iSCSI Initiator Configuration Screen

4. Select **Controller Configuration** and press **<Enter>**.
   - If you are running a single adapter, the Controller Configuration screen (Figure 8-3 on page 99) is displayed.
   - If you are running multiple adapters, the Controller Selection Menu screen (Figure 8-2 on page 99) is displayed.

Controller Selection Menu
Controller #0 - Port #0: Bus 42 Dev 00
Controller #0 - Port #1: Bus 42 Dev 00
Controller #0 - Port #2: Bus 42 Dev 00
Controller #0 - Port #3: Bus 42 Dev 00

Figure 8-2 Controller Selection Menu Screen

5. From the Controller Selection Menu screen (Figure 8-2 on page 99), select the adapter and port then press **<Enter>**. For more information, see "Selecting an Adapter" on page 102.
6. After you have selected the adapter, the Controller Configuration screen (Figure 8-3 on page 99) is displayed.

Figure 8-3 Controller Configuration Screen

7. From this screen, select **Controller Properties** and press **<Enter>**. The Controller Properties screen (Figure 8-4 on page 99) is displayed. For more information on the Controller Properties screen, see "Viewing the Controller Properties" on page 103.

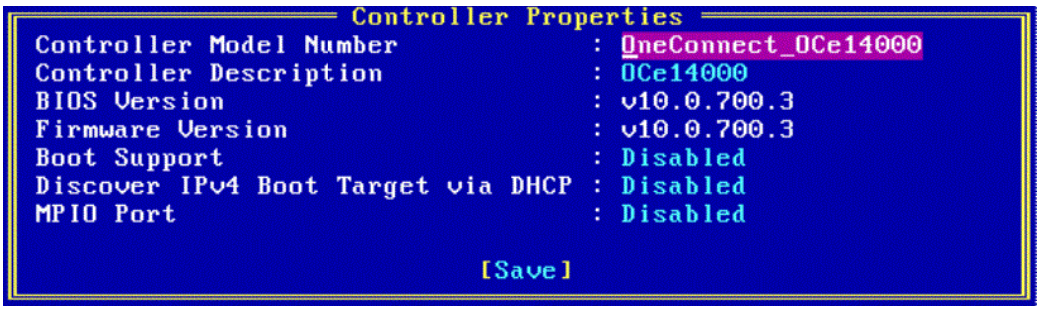
Controller Properties
Controller Model Number : OneConnect_OCe14000
Controller Description : OCe14000
BIOS Version : v10.0.700.3
Firmware Version : v10.0.700.3
Boot Support : Disabled
Discover IPv4 Boot Target via DHCP : Disabled
MPIO Port : Disabled
[Save]

Figure 8-4 Controller Properties Screen

8. Ensure Boot Support is set to Enabled.

9. Select **Save** and press **<Enter>**.
10. From the Controller Configuration screen (Figure 8-3 on page 99), select **Network Configuration** and press **<Enter>**. The Network Configuration screen (Figure 8-5 on page 100) is displayed.

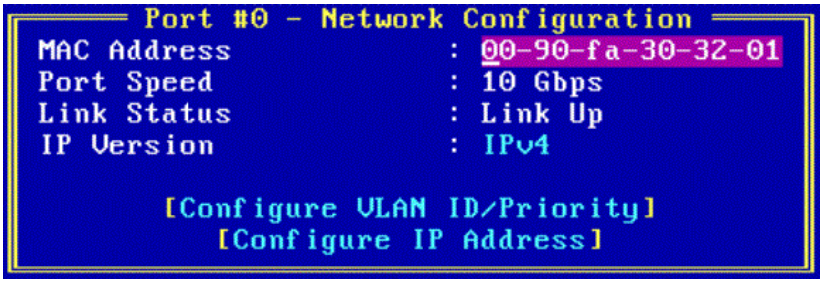
Port #0 - Network Configuration
MAC Address : 00-90-fa-30-32-01
Port Speed : 10 Gbps
Link Status : Link Up
IP Version : IPv4
[Configure VLAN ID/Priority]
[Configure IP Address]

Figure 8-5 Network Configuration Screen

11. Configure a network IP address. From the Network Configuration screen, you can do the following:
    - Select the IP version (IPv4 or IPv6). For more information, see "Selecting the IP Version" on page 106.
    - Set up an IP address. For more information, see "Configuring an IP Address" on page 107.
12. If desired, configure a VLAN ID. For more information, see "Configuring VLAN ID and VLAN Priority" on page 106.
13. After configuring the network, you can add a SCSI target. From the Controller Configuration screen (Figure 8-3 on page 99), select **iSCSI Target Configuration**, then select **Add a New iSCSI Target**. For more information, see "Adding iSCSI Targets" on page 113.
14. After you have configured the iSCSI initiator and target, reboot the system.

Booting the System

After you have set up the basic boot configuration, exit the iSCSISelect utility and the system automatically reboots. During the next boot, the iSCSI BIOS logs into the configured iSCSI boot target and displays its target and LUN information in the BIOS sign-on banner. For example:

```
Controller#0 Port#0 Base 0xFCE60000 at Bus:01 Dev:00 Fun:02
Controller#0 Port#1 Base 0xFCEA0000 at Bus:01 Dev:00 Fun:03

<<< Press <Ctrl><S> for iSCSISelect(TM) Utility >>>

Initiator iSCSI Name:  iqn.2004-05.com.emulex
Initiator IP Address:  172. 40.  1.41
Initiator IP Address:  172. 40.  1.62

Drive #0 NETAPP   LUN 0  2048 MB
Drive Geometry    105    3FFF
BIOS Installed Successfully!
```

9. Configuring and Managing the iSCSI Initiator with the iSCSISelect Utility

The iSCSI initiator or host (also known as the iSCSI client) is a system that attaches to an IP network and initiates requests and receives responses from an iSCSI target. Each iSCSI host is identified by a unique IQN.

After you have an initiator host system running, you must configure the initiator to allow access to the iSCSI SAN. To do this, you must:

1. Configure the iSCSI initiator name.
2. Select an adapter. For additional information, see “Selecting an Adapter” on page 102.
3. Configure network properties. For additional information, see “Configuring Network Properties” on page 105.

Configuring the iSCSI Initiator Name

The iSCSI initiator name is a unique identifier for the initiator on the network and configures target access. It must be unique to that system on the network and is identified by an IQN. The iSCSI initiator name is global to the entire system. The iSCSI initiator name must also match the target's ACL. After you log into the iSCSISelect utility, you can configure the iSCSI initiator name from the iSCSI Initiator Configuration screen.

Note: When installing Microsoft software iSCSI initiator service, the iSCSI initiator name for OneConnect will change and any IQN name previously configured through the iSCSISelect utility will be overridden. Though this will not affect existing boot sessions and persistent sessions, new target logins can fail because the new IQN name may not match the incoming initiator IQN names configured on the target. To avoid this situation, after installing Microsoft software, you must rename the IQN name to the IQN name you had configured previously.

To configure the iSCSI initiator name:

1. Log into the iSCSISelect utility by pressing **<Ctrl+S>** when prompted. After the BIOS is initialized, the iSCSI Initiator Configuration screen (Figure 9-1 on page 101) is displayed.
2. Set or change the iSCSI initiator name.

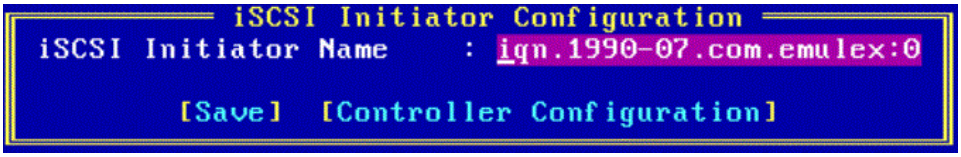

Figure 9-1 iSCSI Initiator Configuration Screen

Note: If there are multiple adapters in the system, the iSCSI initiator name may be different for each adapter. If this happens, an error message indicates an

iSCSI initiator name mismatch. You must save a new initiator name so that the iSCSI initiator name on all the adapters match. If there were pre-existing sessions before the iSCSI initiator name change, the pre-existing sessions use the original name that was used to log in the first time. The new name is used for any sessions added after the name change.

3. Select **Save** and press **<Enter>** to save the iSCSI initiator name. If you select **Controller Configuration** without saving the changes, a warning message states that the settings will be lost and asks if you want to cancel the changes. If you press **<Y>**, the changes will be lost. If you press **<N>,** you will return to the iSCSI Initiator Configuration screen.

Selecting an Adapter

After you configure an ISCSI initiator name, select an adapter to configure the iSCSI target. If you are running the iSCSISelect utility with multiple adapters, all the adapters are listed in the Controller Selection Menu screen (Figure 9-2 on page 102).

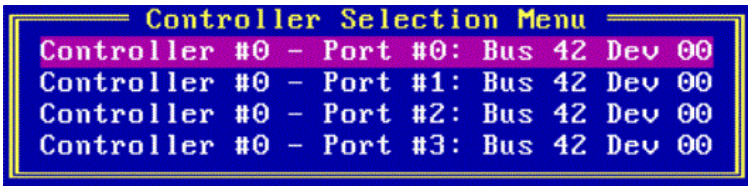
Controller Selection Menu
Controller #0 - Port #0: Bus 42 Dev 00
Controller #0 - Port #1: Bus 42 Dev 00
Controller #0 - Port #2: Bus 42 Dev 00
Controller #0 - Port #3: Bus 42 Dev 00

Figure 9-2 Controller Selection Menu Screen

After you select the adapter, the Controller Configuration screen (Figure 9-3 on page 102) is displayed. From this menu, you can configure and manage the iSCSI initiator and targets.

Figure 9-3 Controller Configuration Screen

To verify that you are configuring the correct port, either:

- Perform port identification; for additional information, see "Identifying a Port" on page 111.
- Check the link status by connecting the port to a 10-Gbps switch port and checking the link status in the Network Configuration screen (Figure 9-8 on page 105); if the status is Link Up, it is the correct port.

  Note: Ensure that you back out of the Network Configuration screen to the Controller Configuration screen before checking the Network Configuration screen. This allows the Link Status field to refresh when you insert or remove the cable from the adapter.

Viewing the Controller Properties

The Controller Properties screen displays adapter information and allows you to configure adapter options such as boot support, IPv4 boot target discovery using DHCP, and MPIO port configuration.

To view the adapter properties:

1. From the Controller Configuration screen (Figure 9-3 on page 102), select **Controller Properties** and press **<Enter>**. The Controller Properties screen (Figure 9-4 on page 103) is displayed.

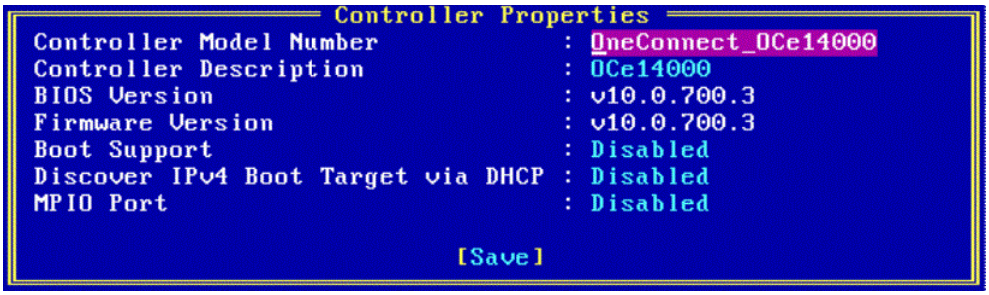
Controller Properties
Controller Model Number : OneConnect_OCe14000
Controller Description : OCe14000
BIOS Version : v10.0.700.3
Firmware Version : v10.0.700.3
Boot Support : Disabled
Discover IPv4 Boot Target via DHCP : Disabled
MPIO Port : Disabled
[Save]

Figure 9-4 Controller Properties Screen

Enabling Boot Support

Boot support is provided for each port or function. If boot support is enabled, you can boot from the specified function. If boot support is disabled, you will not be able to boot from the function.

To enable boot support:

1. From the Controller Properties screen (Figure 9-4 on page 103), select **Boot Support** and press **<Enter>**. A pop-up menu (Figure 9-5 on page 103) is displayed.

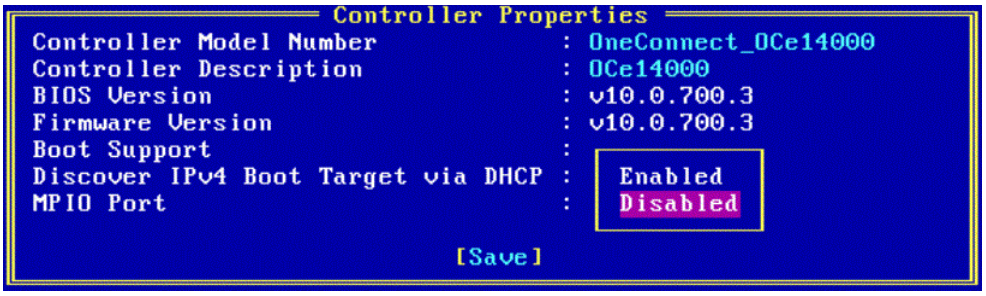

Figure 9-5 Controller Properties Screen with Boot Support Pop-up Menu

2. Select **Enabled** or **Disabled** and press **<Enter>**.
3. To save your changes, select **Save** and press **<Enter>**.

Enabling IPv4 Boot Target Discovery using DHCP

To enable IPv4 boot target discovery using DHCP:

1. From the Controller Properties screen (Figure 9-4 on page 103), select **Discover IPv4 Boot Target via DHCP** and press **<Enter>**. A pop-up menu (Figure 9-6 on page 104) is displayed.

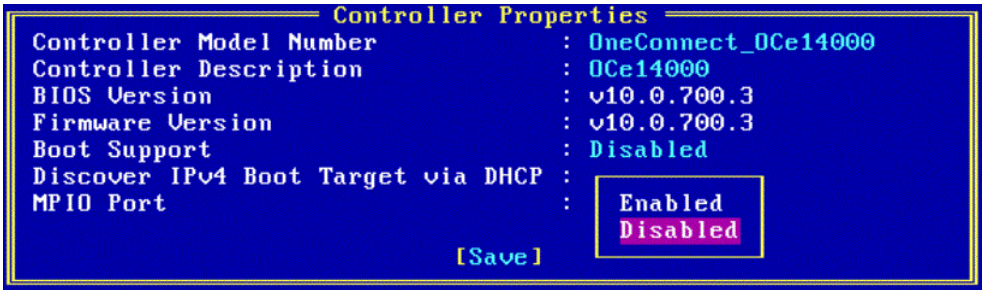

Figure 9-6 Controller Properties Screen with Discover IPv4 Boot Target via DHCP Pop-up Menu

2. Select **Enabled** or **Disabled** and press **<Enter>**.
3. To save your changes, select **Save** and press **<Enter>**.

Enabling the MPIO Port

MPIO support allows the initiator to log in dual sessions to the same target. In this way I/O can be sent over either TCP/IP connection to the target. If one session fails, another session can continue processing I/O without interrupting the application. In iSCSI target configuration, you have the option of setting dual network paths to a single boot LUN.

Note: Although MPIO boot support allows the initiator to log into multiple sessions, the iSCSI BIOS limits the number of sessions to two iSCSI sessions for a single boot LUN.

Follow these steps to configure MPIO boot support for each operating system.

1. Use the Emulex iSCSI configuration utility to configure the first path to a boot target.
2. Complete normal operating system installation.
3. Install third-party MPIO software for your operating system.
4. Configure the second path to a single boot LUN through the Emulex iSCSI configuration utility.

To enable MPIO support:

1. From the Controller Properties screen (Figure 9-4 on page 103), select **MPIO Port** and press **<Enter>**. A pop-up menu (Figure 9-7 on page 105) is displayed.

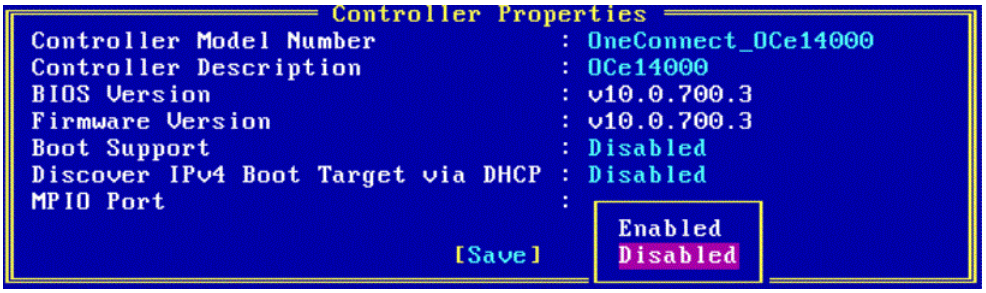

Figure 9-7 Controller Properties Screen with MPIO Port Pop-up Menu

2. Select **Enabled** or **Disabled** and press **<Enter>**.
3. To save your changes, select **Save** and press **<Enter>**.

Configuring Network Properties

The Network Configuration screen displays the MAC address, port speed, and link status for the adapter. From the Network Configuration screen, you can configure the following items:

- IP version
- VLAN ID/priority
- IPv4 or IPv6 address

To view the network configuration:

1. From the Controller Configuration screen (Figure 9-3 on page 102), select **Network Configuration** and press **<Enter>**. The Network Configuration screen (Figure 9-8 on page 105) is displayed.

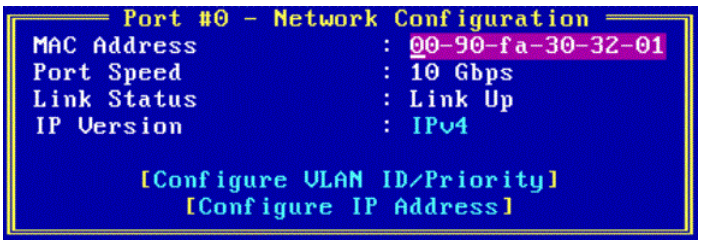
Port #0 - Network Configuration
MAC Address : 00-90-fa-30-32-01
Port Speed : 10 Gbps
Link Status : Link Up
IP Version : IPv4
[Configure VLAN ID/Priority]
[Configure IP Address]

Figure 9-8 Network Configuration Screen

Selecting the IP Version

To select the IP version:

1. From the Network Configuration screen (Figure 9-8 on page 105), select **IP Version** and press **<Enter>**. A pop-up menu (Figure 9-9 on page 106) is displayed.

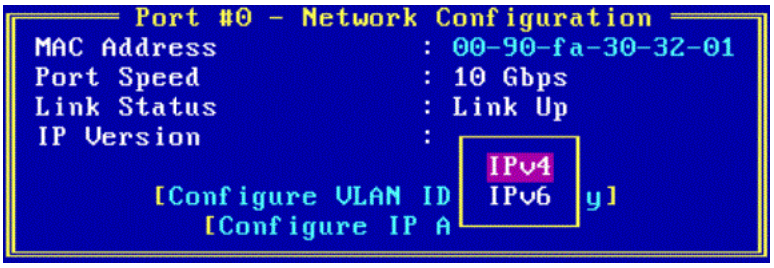

Figure 9-9 Network Configuration Screen with IP Version Pop-up Menu

2. Select **IPv4** or **IPv6** and press **<Enter>**.

Configuring VLAN ID and VLAN Priority

A VLAN is a way to partition the network. If the LAN is made up of all devices within a broadcast domain, a VLAN is a broadcast domain made up of switches. You first create a VLAN and then assign ports to it. All ports in a single VLAN are in a single broadcast domain.

You do not have to configure VLANs unless the network is already using them. Some reasons to use a VLAN include:

- A LAN increases in size with several devices.
- A LAN has increased broadcast traffic on it.
- Groups of users on a LAN need more security.

A VLAN ID, like an IP address or initiator name, is assigned a value to uniquely identify it on a network. A VLAN priority is set to determine priority order for packets within a VLAN.

To configure a VLAN ID and VLAN priority:

1. On the Network Configuration screen (Figure 9-8 on page 105), select **Configure VLAN ID/Priority** and press **<Enter>**. The Configure VLAN ID/Priority screen (Figure 9-10 on page 106) is displayed.

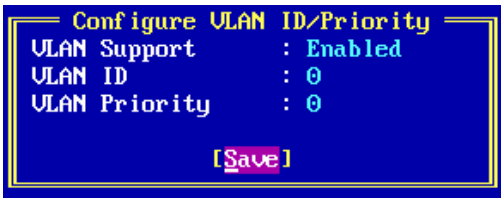

Figure 9-10 Configure VLAN ID/Priority Screen

2. Navigate to VLAN Support and select **Enabled**.
3. Set a VLAN ID number. This is a unique value you assign to each VLAN on a single device. Valid values range from 0 to 4094.

4. Set a VLAN priority, if necessary. This unique value assigns a priority to outbound packets containing a specified VLAN ID. Valid values range from 0 to 7, with 0 the highest priority level.
5. Select **Save** and press **<Enter>**.
6. Press **<Esc>** to return to the Network Configuration screen.

Configuring an IP Address

An IP address is a logical address for the adapter and uniquely identifies the system on a TCP/IP network. Depending on the IP version that you selected, you can either configure an IPv4 address or an IPv6 address.

Configuring an IPv4 Address

The IP address can be determined statically (manually assigned) or dynamically (the DHCP server obtains an IP address). The method that you choose depends on your network configuration. If your network uses a DHCP configuration, then you can enable DHCP and obtain an IP address from the DHCP server. If a DHCP server is not available, you must configure a static IP address.

Notes

- For all Linux-based operating systems, Emulex recommends that you enable DHCP when attempting to assign an IP address to an iSCSI port, because the iSCSI firmware will not detect it as a duplicate IP address if one already exists on a Linux server. Otherwise, you must manually ensure that the IP address you assign is not already used.
- If you are using target discovery through DHCP, you must add the root path to the DHCP server and enable DHCP discovery through the iSCSISelect utility.

To configure an IPv4 address:

1. On the Network Configuration screen (Figure 9-8 on page 105), ensure that the IP Version is set to IPv4.
2. Select **Configure IP Address** and press **<Enter>**. The Configure IPv4 Address screen (Figure 9-11 on page 107) is displayed

Figure 9-11 Configure IPv4 Address Screen

3. From the Configure IPv4 Address screen, you can do the following:
   - Enable DHCP for automatic assignment of the IP address through a DHCP server. See "Enabling DHCP" on page 108 for more information.
   - Configure a static IP address (if DHCP is disabled). See "Configuring a Static IPv4 Address" on page 109 for more information.

- Ping the iSCSI initiator. See "Pinging the iSCSI Initiator" on page 110 for more information.

Enabling DHCP

Enabling DHCP provides the initiator with an IP address.

Note: If you are using the DHCP server to obtain an IP address for the iSCSI initiator, set up a reservation. A reservation assigns a specific IP address based on the MAC address of the iSCSI function. If you do not reserve an IP address through DHCP, then you must set the lease length for the iSCSI initiator IP address to unlimited. This prevents the IP address lease from expiring.

To enable DHCP:

1. From the Configure IPv4 Address screen (Figure 9-11 on page 107), select **Enabled** from the DHCP pop-up menu and press **<Enter>**.
2. Select **Save DHCP Settings** and press **<Enter>**. The DHCP IP Address dialog box (Figure 9-12 on page 108) is displayed.

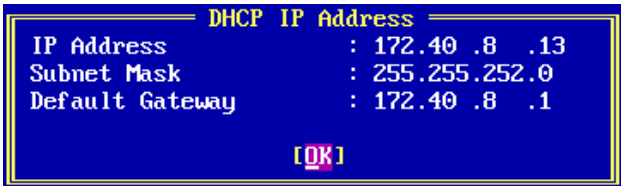

Figure 9-12 DHCP IP Address Dialog Box

Note: If you have set a static IP address, a message warns that the static IP address will be lost. Press **<Y>** to continue with enabling DHCP.

3. Click **OK**.

Configuring an IPv6 Address

To configure an IPv6 address:

1. On the Network Configuration screen (Figure 9-8 on page 105), ensure that the IP Version is set to IPv6.
2. Select **Configure IP Address** and press **<Enter>**. The Configure IPv6 Address screen (Figure 9-13 on page 108) is displayed

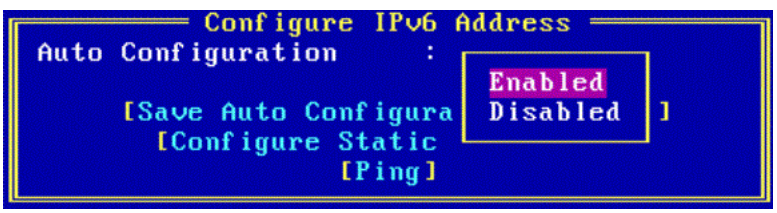

Figure 9-13 Configure IPv6 Address Screen

3. From the Configure IPv6 Address screen, you can do the following:
   - Enable auto-configuration for automatic assignment of the IP address. See "Enabling DHCP" on page 108 for more information.

- Configure a static IP address (if Auto Configuration is disabled). See "Configuring a Static IPv6 Address" on page 110 for more information.
- Ping the iSCSI initiator. See "Pinging the iSCSI Initiator" on page 110 for more information.

Enabling Auto Configuration

To automatically configure the IPv6 address, from the Configure IPv6 Address screen (Figure 9-13 on page 108), select **Enabled** from the Auto Configuration pop-up menu and press **<Enter>**.

Configuring a Static IPv4 Address

If a DHCP server is not available, you must manually configure a static IPv4 address.

To configure a static IP address:

1. From the Configure IPv4 Address screen (Figure 9-11 on page 107), select **Configure Static IP Address** and press **<Enter>**.

   Note: If DHCP is enabled, a message warns that the DHCP IP Address will be lost. Press **<Y>** to continue to configure a static IP address.

   The Static IP Address dialog box is displayed.

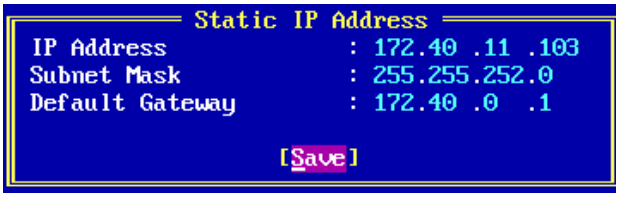

Figure 9-14 Static IP Address Dialog Box for IPv4

2. Enter the IP address. This is a unique 32-bit address that specifies the location of each device or workstation in the network. This address is required for communication to the iSCSI SAN. For an initiator with its own network interface, you must assign an IP address in the same range as the iSCSI SAN.
3. Enter the subnet mask. The subnet mask provides a way to segment networks. All hosts (iSCSI initiators or targets) on the same physical network usually have the same subnet mask. For example, Figure 9-14 on page 109 shows the initiator in the subnet 255.255.xxx.xxx. All the hosts (initiators or targets) in a sub-network will have the same subnet mask.
4. Enter the default gateway information, if necessary. A gateway is a router on a computer network that serves as an access point to another network and that an initiator uses by default. Any data to addresses not on the initiator's subnet are sent through the default gateway.
5. Select **Save** and press **<Enter>** to save the settings.
6. When you are prompted to save the changes, type **<Y>**.
7. Press **<Esc>** to return to the Network Configuration screen.

Configuring a Static IPv6 Address

If Auto Configuration is disabled, you must manually configure a static IPv6 address.

To configure a static IP address:

1. From the Configure IPv6 Address screen (Figure 9-13 on page 108), select **Configure Static IP Address** and press **<Enter>**.

   The Static IP Address dialog box (Figure 9-15 on page 110) is displayed.

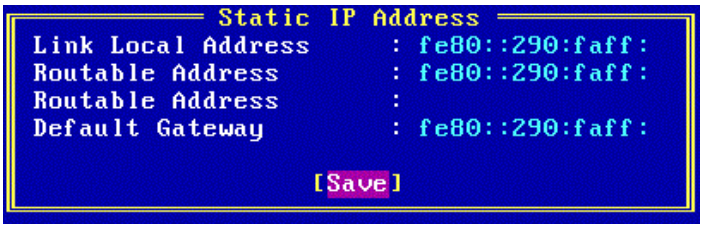

Figure 9-15 Static IP Address Dialog Box for IPv6

2. Enter the following information in the corresponding fields:
   - Link Local Address – The unique address assigned to the port which is available for use inside the local network but not outside of the local network.
   - Routable Address 1 – A routable address assigned to the iSCSI port.
   - Routable Address 2 – A second routable address assigned to the iSCSI port.
   - Default Gateway – A gateway is a router on a computer network that serves as an access point to another network and that an initiator uses by default.
3. Select **Save** and press **<Enter>** to save the settings.
4. You are prompted to save the changes, type **<Y>**.
5. Press **<Esc>** to return to the Network Configuration screen.

Pinging the iSCSI Initiator

After you configure the IPv4 or IPv6 address, you can confirm your network settings by pinging the network. The ping option verifies that the IP address is on the network. If there is another IP entity on that network when you ping, you receive a ping reply back to confirm the network settings. Ping can be a diagnostic tool but it is also a validation that your network is set up properly prior to target login.

To verify that a target is accessible and that you are connected to the network:

1. From the Configure IPv4 Address screen (Figure 9-11 on page 107) or Configure IPv6 Address screen (Figure 9-13 on page 108), select **Ping** and press **<Enter>**.
2. In the Ping Target dialog box, enter the IP address of the iSCSI device you want to ping. You are notified that the ping is successful. If the ping is unsuccessful, you will receive a failed message. For more information, see "Troubleshooting for the iSCSI Protocol" on page 218. Figure 9-16 on page 111 is an example of a successful ping.

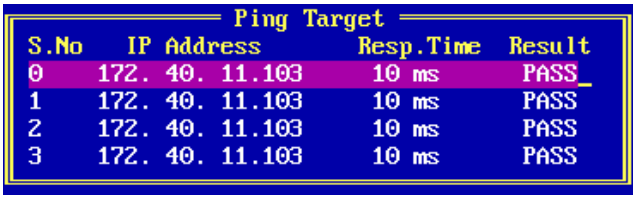
Ping Target
S.No IP Address Resp.Time Result
0 172. 40. 11.103 10 ms PASS
1 172. 40. 11.103 10 ms PASS
2 172. 40. 11.103 10 ms PASS
3 172. 40. 11.103 10 ms PASS

Figure 9-16 Successful Ping Screen

Note: The ping works for any IP address that supports ICMP (Echo).

If you cannot verify the network interface, see "Troubleshooting for the iSCSI Protocol" on page 218.

Identifying a Port

Port identification, or beaconing, helps you determine which port you are configuring by blinking both the link and the activity LEDS of that port.

LEDs blink on the back of the server so that there is no confusion as to which physical port you are configuring with the iSCSISelect utility. Port identification allows you to correlate the iSCSI software configuration with the hardware port.

Note: Not all adapters have LEDs that are externally visible. If you are using an add-in card in a blade server environment, the port identification or beaconing capability does not work.

To identify a port, from the Controller Configuration screen (Figure 9-3 on page 102), select **Port Identification** and press **<Enter>**. The LED status indicators for the selected port blink on the adapter until you select **Done** and press **<Enter>** on the Port Identification screen (Figure 9-17 on page 111).

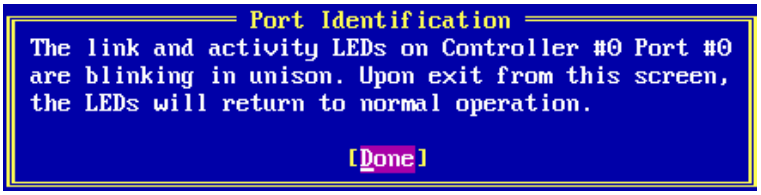
Port Identification
The link and activity LEDs on Controller #0 Port #0
are blinking in unison. Upon exit from this screen,
the LEDs will return to normal operation.
[Done]

Figure 9-17 Port Identification Screen

Erasing the Current Configuration

Erase Configuration erases the configuration of a single adapter. Configuration data is erased for both ports on the selected adapter. The initiator name is global for all OneConnect adapters in the system. If you have more than one adapter and you erase the configuration on the first one, the Erase Configuration option resets the initiator names back to their default values. If you erase the configuration on the second adapter, the default values are reset only for the second adapter and are not reset globally on all adapters.

Note: You must select **Erase Configuration** to clear out existing IQN data if you purchase a different or subsequent license for the adapter.

To erase an adapter configuration:

1. From the Controller Configuration screen (Figure 9-3 on page 102), select **Erase Configuration** and press **<Enter>**.
2. A message is displayed asking if you want to erase the current configuration. Type **<Y>**.
3. You are cautioned that the operation removes any existing configuration permanently. Type **<Y>**.

   After the adapter configuration is erased, the Controller Configuration screen (Figure 9-3 on page 102) is displayed.

10. Configuring and Managing iSCSI Targets with the iSCSISelect Utility

An iSCSI target is any device that receives iSCSI commands. The device can be an end node, such as a storage device, or it can be an intermediate device, such as a bridge between IP and FC devices. Each iSCSI target is identified by a unique IQN, and each port on the adapter (or on a bridge) is identified by one or more IP addresses.

As the client system, the initiator initiates disk I/O. It communicates with the target, and the target serves the initiator by providing resources to the initiator.

After you configure the iSCSI initiator and have verified that the network interface is working, you can log into the target to establish the connection. To do this, you must:

- Perform a login to the target (adding a target).
- Ping a target and verify that you can connect to it.
- Reboot the system.

Adding iSCSI Targets

After the initiator has been configured, you must make an iSCSI target available to the initiator host. Targets can be discovered automatically using SendTargets discovery, or you can manually configure targets.

Before you begin the login session, gather the following information:

- iSCSI target name (manual configuration only) – The target name that you are adding. This name should be known to you based on how you configured the iSCSI target. For more information, see "Using SendTargets Discovery to Add an iSCSI Target" on page 113.
- iSCSI target IP address – The IP address of the target into which you are logging.
- TCP port number – The TCP port number of the target portal. Typically this is 3260, which is the well-known port number defined for use by iSCSI.

Using SendTargets Discovery to Add an iSCSI Target

The iSCSI initiator uses SendTargets discovery to locate names of available targets. Use this method if an iSCSI node has a large number of targets.

To configure an iSCSI target using the SendTargets discovery:

1. Log into the iSCSISelect utility by pressing **<Ctrl+S>** when prompted.
2. Select **Controller Configuration** and press **<Enter>**. A list of adapters is displayed.

3. Select an adapter and press **<Enter>**. The Controller Configuration screen (Figure 10-1 on page 114) is displayed.

Figure 10-1 Controller Configuration Screen

4. Select **iSCSI Target Configuration** and press **<Enter>**.
5. Select **Add New iSCSI Target** and press **<Enter>**. The Add/Ping iSCSI Target screen (Figure 10-2 on page 114) is displayed.

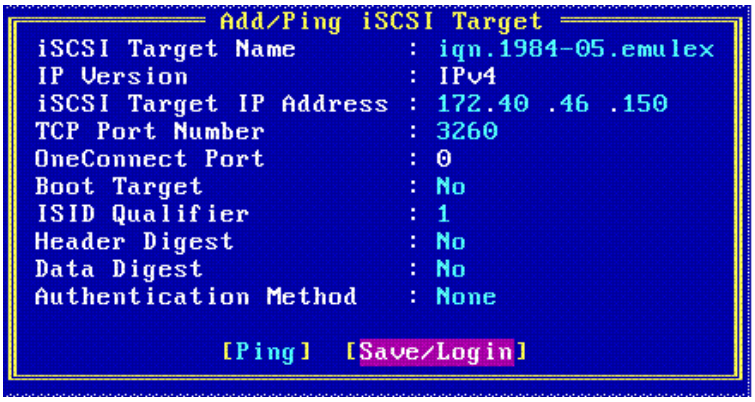
Add/Ping iSCSI Target
iSCSI Target Name : iqn.1984-05.emulex
IP Version : IPv4
iSCSI Target IP Address : 172.40 .46 .150
TCP Port Number : 3260
OneConnect Port : 0
Boot Target : No
ISID Qualifier : 1
Header Digest : No
Data Digest : No
Authentication Method : None
[Ping] [Save/Login]

Figure 10-2 Add/Ping iSCSI Target Screen

6. Leave the iSCSI Target Name blank.
7. Enter the iSCSI target IP address.
8. Change the TCP port number value, if necessary. The default target port number is 3260.
9. Leave the Boot Target field set to “No” for now; you will return to this field later to enable the boot target.
10. If you are connecting dual sessions to the same target portal group, enter a unique ISID Qualifier, which can be any number up to 65535. For more information on when an ISID value must be changed, see “Booting from SAN for iSCSI MPIO” on page 75.
11. Set the Header Digest to Yes if you want to enable the header digest. If the Header Digest is set to Yes, and the iSCSI initiator is set accordingly, the integrity of an iSCSI protocol data unit’s header segment is protected by CRC32C checksum. The default is disabled.
12. Set the Data Digest to Yes if you want to enable the data digest. If the Data Digest is set to Yes, and the iSCSI initiator is set accordingly, the integrity of an iSCSI protocol data unit’s data segment is protected by CRC32C checksum. The default is disabled.
13. Select an authentication method (optional). If you are enabling an authentication method, you are prompted to enter CHAP configuration. For more information, see

"Enabling CHAP Authentication" on page 119.

14. Select **Save/Login**. A message reminds you that you have left the iSCSI Target name blank and that the SendTargets mechanism will be used. If you want to continue, press **<Y>**.
15. After you send the SendTargets request, the firmware attempts to log into the target. If it is successful, the Targets Discovered Via SendTargets screen (Figure 10-3 on page 115) displays a list of targets.

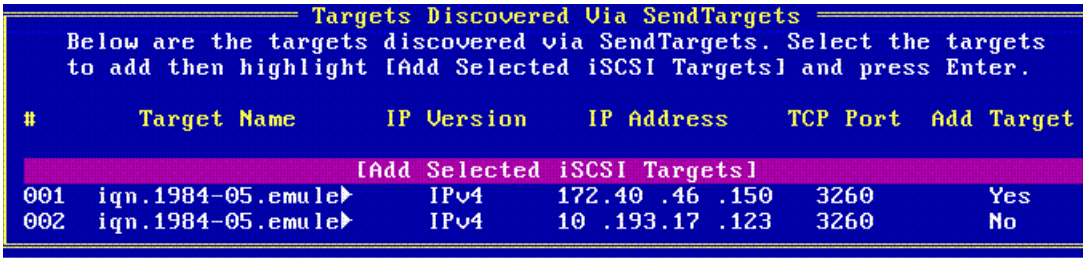
Targets Discovered Via SendTargets
Below are the targets discovered via SendTargets. Select the targets to add then highlight [Add Selected iSCSI Targets] and press Enter.
Target Name IP Version IP Address TCP Port Add Target
[Add Selected iSCSI Targets]
001 iqn.1984-05.emule IPv4 172.40 .46 .150 3260 Yes
002 iqn.1984-05.emule IPv4 10 .193.17 .123 3260 No

Figure 10-3 Targets Discovered Via SendTargets Screen

16. Select the targets you want to add from the list and press **<F3>**.
17. Add these targets to the list of iSCSI targets available for the initiator to log into by selecting **Add Selected iSCSI Targets**, and press **<Enter>**. If you enabled CHAP Authentication, you are prompted to enter the CHAP configuration for each target, one at a time. For more information, see "Enabling CHAP Authentication" on page 119.
18. From the Controller Configuration screen (Figure 10-1 on page 114), select **iSCSI Target Configuration** and press **<Enter>** to view the added target information (Figure 10-4 on page 115).

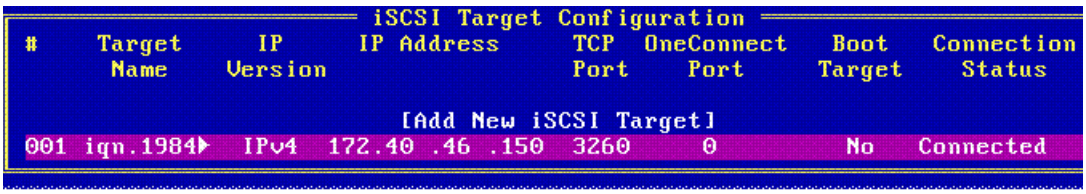
iSCSI Target Configuration
Target Name IP Version IP Address TCP Port OneConnect Port Boot Target Connection Status
[Add New iSCSI Target]
001 iqn.1984 IPv4 172.40 .46 .150 3260 0 No Connected

Figure 10-4 iSCSI Target Configuration Screen

Note: If you set the Boot Target option in step 5 before adding the target, Boot Target is displayed as No. To enable Boot Target, continue with step 19. Otherwise, you have completed the procedure.

19. To enable Boot Target or make any other changes to the targets, select the target and press **<Enter>**. The Edit/Ping iSCSI Target screen (Figure 10-6 on page 118) is displayed. From this screen, you can edit the target.

Manually Adding an iSCSI Target

Use this method if an iSCSI node has a small number of targets, or if you want to restrict the targets that an initiator can access. To manually configure a target, you must provide the iSCSI target name.

To configure an iSCSI target manually:

1. Log into the iSCSISelect utility by pressing **<Ctrl+S>** when prompted.
2. Select **Controller Configuration** and press **<Enter>**. A list of adapters is displayed.
3. Select an adapter and press **<Enter>**. The Controller Configuration screen (Figure 10-1 on page 114) is displayed.
4. Select **iSCSI Target Configuration** and press **<Enter>**. The iSCSI Target Configuration screen (Figure 10-4 on page 115) is displayed.
5. Select **Add New iSCSI Target** and press **<Enter>**. The Add/Ping iSCSI Target screen (Figure 10-2 on page 114) is displayed.
6. Enter the iSCSI target name, iSCSI target IP address, and TCP port number (the default target port number is 3260).
7. If you want to enable the target as a boot target, select **Yes**.
8. If you are connecting dual sessions to the same target portal group, enter a unique ISID Qualifier, which can be any number up to 65535. For more information on when an ISID value must be changed, see "Booting from SAN for iSCSI MPIO" on page 75.
9. Set the Header Digest to Yes if you want to enable the header digest. If the Header Digest is set to Yes, and the iSCSI initiator is set accordingly, the integrity of an iSCSI protocol data unit's header segment is protected by CRC32C checksum. The default is disabled.
10. Set the Data Digest to Yes if you want to enable the data digest. If the Data Digest is set to Yes, and the iSCSI initiator is set accordingly, the integrity of an iSCSI protocol data unit's data segment is protected by CRC32C checksum. The default is disabled.
11. Select the Authentication Method. For more information, see "Enabling CHAP Authentication" on page 119.
12. Select **Save/Login** and press **<Enter>**. If the firmware logs into the target successfully, you receive a successful login message. Press **<Esc>** to go to the iSCSI Target Configuration screen (Figure 10-4 on page 115), where you can view information about the added target.
13. To enable Boot Target or make any other changes to the targets, select the target and press **<Enter>**.

Managing an iSCSI Target

With the iSCSISelect utility, you can manage a target by viewing target details or by editing the target configuration.

Viewing Target Information

After you have successfully logged into the target, you can view the details of the newly added target or manage the target. From the Controller Configuration screen (Figure 10-1 on page 114), select **iSCSI Target Configuration** and press **<Enter>** to view the target information.

Note: The iSCSISelect utility shows LUN information for the first 128 LUNs only.

Figure 10-5 on page 117 is an example of a target detail.

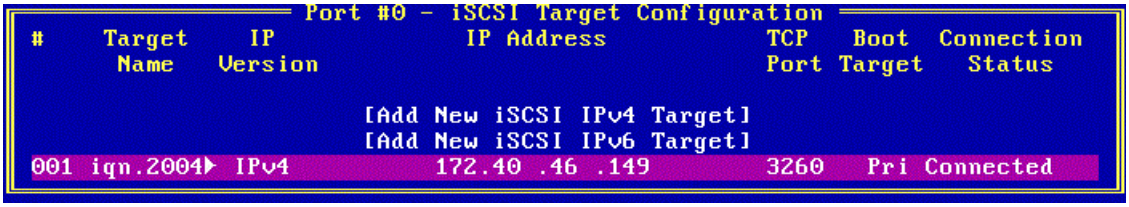

Figure 10-5 iSCSI Target Configuration Information Screen

In the iSCSI Target Configuration screen, the functions keys located at the bottom of the menu help you manage the target configuration.

- Press **<Enter>** to select the target configuration.
- Press **<Del>** to delete the target.
- Press **<F5>** to log in to the target.
- Press **<F6>** to log out of the target.
- Press **<F7>** to configure the LUN.
- Press **<Esc>** to return to the previous screen.

Editing a Target Configuration

After you have added a target, you can edit the iSCSI target configuration or apply other management options to the target.

Note: If you want to change the target name, you must delete the existing target and add it again with the new target name.

To edit a target configuration:

1. From the iSCSI Target Configuration screen (Figure 10-4 on page 115), select the target and press **<Enter>**. The Edit/Ping iSCSI Target screen (Figure 10-6 on page 118) is displayed.

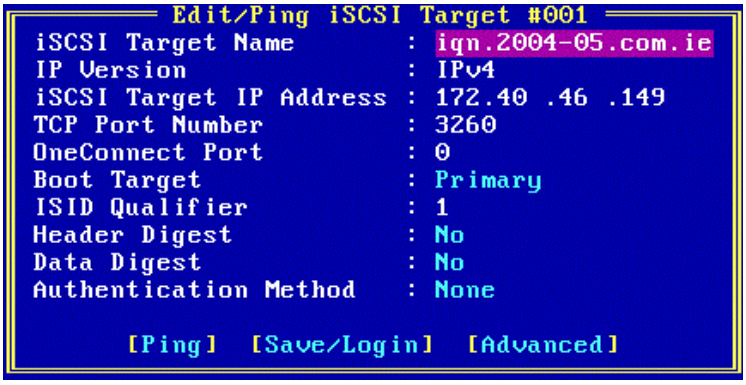
Edit/Ping iSCSI Target #001
iSCSI Target Name : iqn.2004-05.com.ie
IP Version : IPv4
iSCSI Target IP Address : 172.40 .46 .149
TCP Port Number : 3260
OneConnect Port : 0
Boot Target : Primary
ISID Qualifier : 1
Header Digest : No
Data Digest : No
Authentication Method : None
[Ping] [Save/Login] [Advanced]

Figure 10-6 Edit/Ping iSCSI Target Screen

2. If you want to enable the target as a boot target, select **Boot Target** and select either **Primary** or **Secondary** in the Boot Target pop-up menu.
3. If you are connecting dual sessions to the same target portal group, enter a unique ISID Qualifier, which can be any number up to 65535. For more information on when an ISID value must be changed, see "Booting from SAN for iSCSI MPIO" on page 75.
4. Set the Header Digest to Yes if you want to enable the header digest. If the Header Digest is set to Yes, and the iSCSI initiator is set accordingly, the integrity of an iSCSI protocol data unit's header segment is protected by CRC32C checksum. The default is disabled.
5. Set the Data Digest to Yes if you want to enable the data digest. If the Data Digest is set to Yes, and the iSCSI initiator is set accordingly, the integrity of an iSCSI protocol data unit's data segment is protected by CRC32C checksum. The default is disabled.
6. To select an authentication method to use when logging into the target, select an authentication method from the Authentication Method pop-up menu. For more information about authentication methods, see "Enabling CHAP Authentication" on page 119.
7. To verify the target connection, select **Ping** and press **<Enter>**. For more information about ping, see "Adding iSCSI Targets" on page 113.
8. To view more target properties, select **Advanced** and press **<Enter>**. For more information on these properties, see "Viewing Advanced Target Properties" on page 122.
9. To save your changes, select **Save/Login** and press **<Enter>**.

   The iSCSI Target Configuration screen is displayed with the revised information.

Enabling CHAP Authentication

The iSCSISelect utility uses CHAP to authenticate initiators and targets for added network security. By using a challenge and response security mechanism, CHAP periodically verifies the initiator's identity. This authentication method depends on a secret key known to the initiator and the target only. Although the authentication can be one-way, you can negotiate CHAP in both directions with the help of the same secret set for mutual authentication. You must make sure however, that what you configure on the target side matches the initiator side. The iSCSISelect utility supports both one-way and mutual authentication.

Authenticating One-Way CHAP

With one-way CHAP authentication, the target authenticates the initiator. Use one-way CHAP authentication for a one-way challenge and response security method.

To enable one-way CHAP authentication:

1. Log into the iSCSISelect utility by pressing **<Ctrl+S>** when prompted.
2. Select **Controller Configuration**. A list of adapters is displayed.
3. Select an adapter and press **<Enter>**. The Controller Configuration screen (Figure 10-1 on page 114) is displayed.
4. Select **iSCSI Target Configuration** and press **<Enter>**. The iSCSI Target Configuration screen (Figure 10-4 on page 115) is displayed.
5. Select **Add New iSCSI Target** and press **<Enter>**.
6. Follow steps 5–11 in the procedure "Using SendTargets Discovery to Add an iSCSI Target" on page 113.
7. On the Add/Ping iSCSI Target screen (Figure 10-2 on page 114), select **Authentication Method**, select **One-Way Chap**, and press **<Enter>**. The CHAP Configuration dialog box (Figure 10-7 on page 119) is displayed.

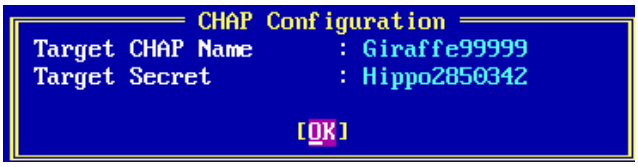

Figure 10-7 One-way Chap Configuration Dialog Box

8. Enter the target CHAP name and target secret, then select **OK** and press **<Enter>**.

   The target CHAP name can be any name or sequence of numbers consisting of 12 to 16 characters. However, the name and secret on the target side must match the name and target on the initiator side.

   The target secret can be in string (for example, abcdefg23456) or hexadecimal (for example, 0x01234567890123456789ABCD) format.

   - For string format, the secret can be any name or sequence of numbers with a minimum of 12 and a maximum of 16 bytes, where each character equals one byte.

- For hexadecimal format, the secret must be a minimum of 12 and a maximum of 16 bytes long, where two characters equal one byte and the character length must be even (24, 26, 28, 30, or 32).
- The following restrictions apply to hexadecimal formatting:
  - The 0x representation requires an even number of hexadecimal values excluding the 0x (0-9, A-F). For example, the secret 0x123456789012345678 9ABCD is not allowed because the character length is odd, with 23 hexadecimal values excluding the 0x. The secret 0x0123456789012345678 9ABCD is allowed, with 24 hexadecimal values excluding the 0x.
  - The hexadecimal representation of CHAP secrets must contain hexadecimal values only. The 0x representation may include only the following characters: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, a, b, c, d, e, f, A, B, C, D, E, and F. Any other characters are not allowed.

After you have enabled the CHAP authentication, the Add/Ping iSCSI Target screen (Figure 10-2 on page 114) is displayed. For more information, see "Pinging a Target" on page 121.

Authenticating Mutual CHAP

With mutual CHAP authentication, the target authenticates the initiator and the initiator authenticates the target. Use mutual CHAP authentication for a two-way challenge and response security method.

To enable mutual CHAP authentication:

1. Log into the iSCSISelect utility by pressing **<Ctrl+S>** when prompted.
2. Select **Controller Configuration** and press **<Enter>**. A list of adapters is displayed.
3. Select an adapter and press **<Enter>**. The Controller Configuration screen (Figure 10-1 on page 114) is displayed.
4. Select **iSCSI Target Configuration** and press **<Enter>**. The iSCSI Target Configuration screen (Figure 10-4 on page 115) is displayed.
5. Select **Add New iSCSI Target** and press **<Enter>**. The Add/Ping iSCSI Target screen (Figure 10-2 on page 114) is displayed.
6. Select **Authentication Method**, select **Mutual Chap**, and press **<Enter>**. The CHAP Configuration dialog box (Figure 10-8 on page 120) is displayed.

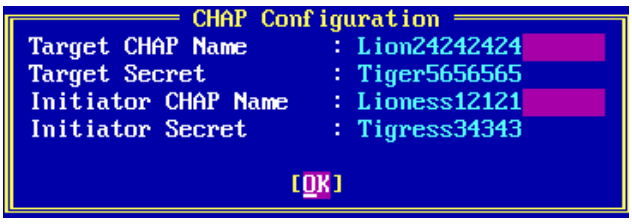

Figure 10-8 Mutual CHAP Configuration Dialog Box

7. Enter the target CHAP name, target secret, initiator CHAP name, and initiator secret. Select **OK** and press **<Enter>**.

The target CHAP name can be any name or sequence of numbers with a minimum of 12 and a maximum of 16 characters. However, the name and secret on the target side must match the name and target on the initiator side.

The target secret can be in string (for example, abcdefg23456) or hexadecimal (for example, 0x0123456789012345678 9ABCD) format.

- For string format, the secret can be any name or sequence of numbers with a minimum of 12 and a maximum of 16 bytes, where each character equals one byte.
- For hexadecimal format, the secret must be a minimum of 12 and a maximum of 16 bytes long, where two characters equal one byte and the character length must be even (24, 26, 28, 30, or 32).
- The following restrictions apply to hexadecimal formatting:
  - The 0x representation requires an even number of hexadecimal values excluding the 0x (0-9, A-F). For example, the secret 0x123456789012345678 9ABCD is not allowed because the character length is odd, with 23 hexadecimal values excluding the 0x. The secret 0x0123456789012345678 9ABCD is allowed, with 24 hexadecimal values excluding the 0x.
  - The hexadecimal representation of CHAP secrets must contain hexadecimal values only. The 0x representation may include only the following characters: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, a, b, c, d, e, f, A, B, C, D, E, and F. Any other characters are not allowed.

After you have enabled the CHAP authentication, the Add/Ping iSCSI Target screen (Figure 10-2 on page 114) is displayed.

Pinging a Target

To ping a target:

1. From the Controller Configuration screen (Figure 10-1 on page 114), select **iSCSI Target Configuration** and press **<Enter>**. The iSCSI Target Configuration screen (Figure 10-4 on page 115) is displayed.
2. Select **Add/Ping iSCSI Target** or **Edit/Ping iSCSI Target** and press **<Enter>**. The "iSCSI Target IP Address" is the address that will be pinged.
3. From the Add/Ping iSCSI Target screen (Figure 10-2 on page 114) or the Edit/Ping iSCSI Target screen (Figure 10-6 on page 118), select **Ping** and press **<Enter>**.

   The Ping Target screen (Figure 10-9 on page 130) displays the results of the ping.

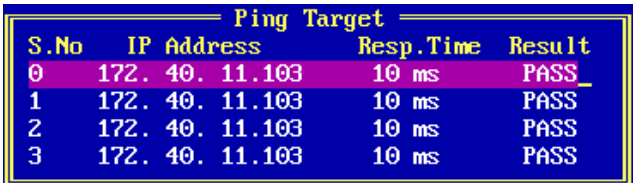
Ping Target
S.No IP Address Resp.Time Result
0 172. 40. 11.103 10 ms PASS
1 172. 40. 11.103 10 ms PASS
2 172. 40. 11.103 10 ms PASS
3 172. 40. 11.103 10 ms PASS

Figure 10-9 Ping Target Results

A ping can be unsuccessful for several reasons; for more information, see "Troubleshooting for the iSCSI Protocol" on page 218.

Viewing Advanced Target Properties

After you have logged into a target, you can view more information about it by navigating to the Edit/Ping iSCSI Target screen (Figure 10-6 on page 118), selecting the **Advanced** option, and pressing **<Enter>**. The Advanced Target Properties screen (Figure 10-10 on page 122) is displayed.

Figure 10-10 Advanced Target Properties Screen

Configuring LUN Settings

A LUN represents an individually addressable logical device that is part of a target. An initiator negotiates with a target to establish connectivity to a LUN.

To configure a LUN:

1. From the iSCSI Target Configuration screen (Figure 10-4 on page 115), press **<F7>** to show the LUNs associated with the iSCSI node.

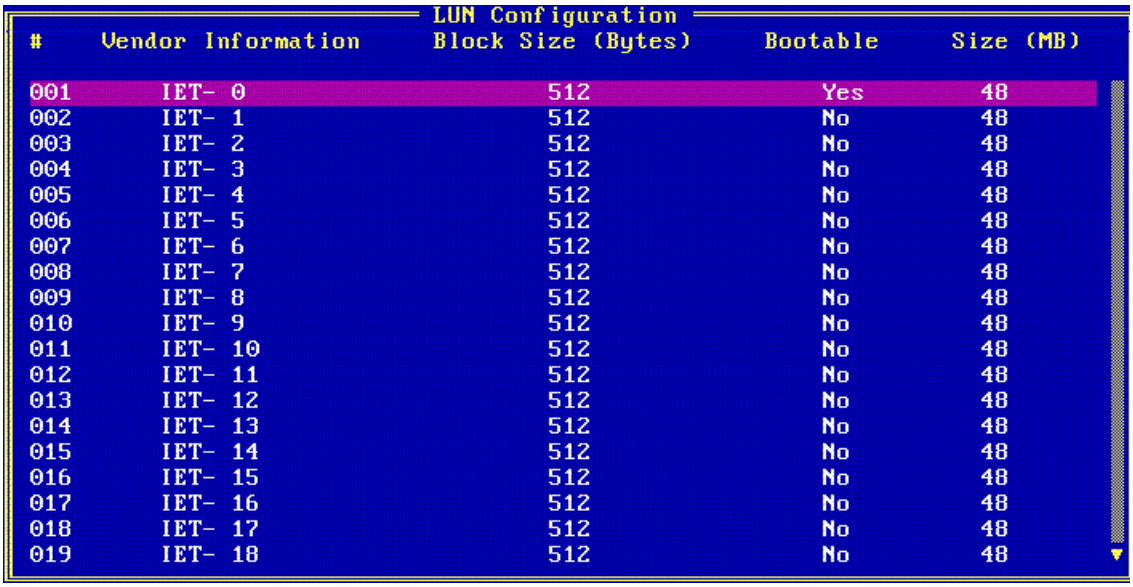

Figure 10-11 LUN Configuration Menu

2. If the target is a boot target, press **<F3>** to set the boot LUN. By setting the LUN to bootable, you can confirm that the boot target is configured properly and you can see the LUN that is booting. By looking at the LUN size, you can also identify each target along with its LUN order.

Note: The LUN order is determined by the target and is in the order listed.

If there are no LUNs available, the following message is displayed:

```
No LUN available, please check your configuration on the Target.
```

For more information, see "Troubleshooting for the iSCSI Protocol" on page 218.

Logging Into and Out of a Configured Target

To log into a target, from the iSCSI Target Configuration screen (Figure 10-4 on page 115), select the disconnected target, and then press **<F5>** to establish the target session.

If you log out of a target, it is still included in the target list, with the status of disconnected. You are deleting the target session only; you can log back into it.

To log out of a target, from the iSCSI Target Configuration screen (Figure 10-4 on page 115), select the target and press **<F6>**.

Removing a Configured Target

To fully remove a target, from the iSCSI Target Configuration screen (Figure 10-4 on page 115), select the disconnected target and press the **<Delete>** key.

Booting the System

After you have configured the iSCSI initiator and target, you must reboot the system for the configurations to take effect. When you exit the iSCSISelect utility, the system automatically reboots, and during system startup the Emulex adapter BIOS information is displayed. For example:

```
Controller#0 Port#0 Base 0xFCE60000 at Bus:01 Dev:00 Fun:02
Controller#0 Port#1 Base 0xFCEA0000 at Bus:01 Dev:00 Fun:03

<<< Press <Ctrl><S> for iSCSISelect(TM) Utility >>>

Initiator iSCSI Name:  iqn.2004-05.com.emulex
Initiator IP Address:  172. 40.  1.41
Initiator IP Address:  172. 40.  1.62
BIOS Not Installed.
```

Note: The iSCSI BIOS logs into the configured iSCSI boot target and shows its target and LUN information in the BIOS sign-on banner only if you have configured an iSCSI boot target. For more information, see "Setting Up a Basic iSCSI Boot Configuration" on page 98.

Discovering Targets through DHCP for iSCSI

For the target to be discovered by the initiator through DHCP, you must add the root path to the DHCP server:

1. From the DHCP server screen (Figure 10-12 on page 124), select **Scope Options**, then right-click and select **Configure Options**.

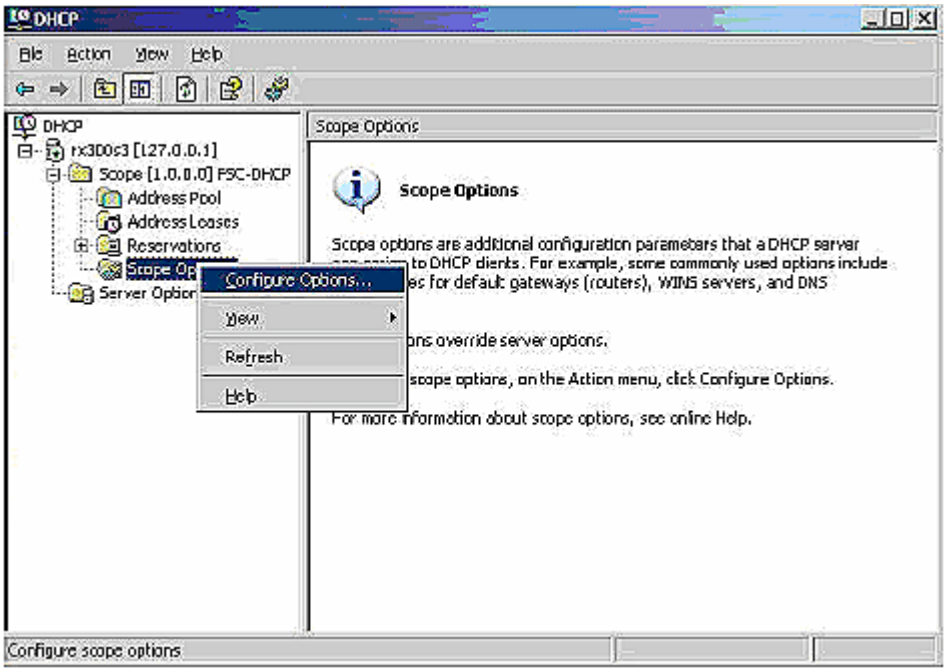

Figure 10-12 DHCP Server Screen

2. From the General tab (Figure 10-13 on page 125), select **017 Root Path**.

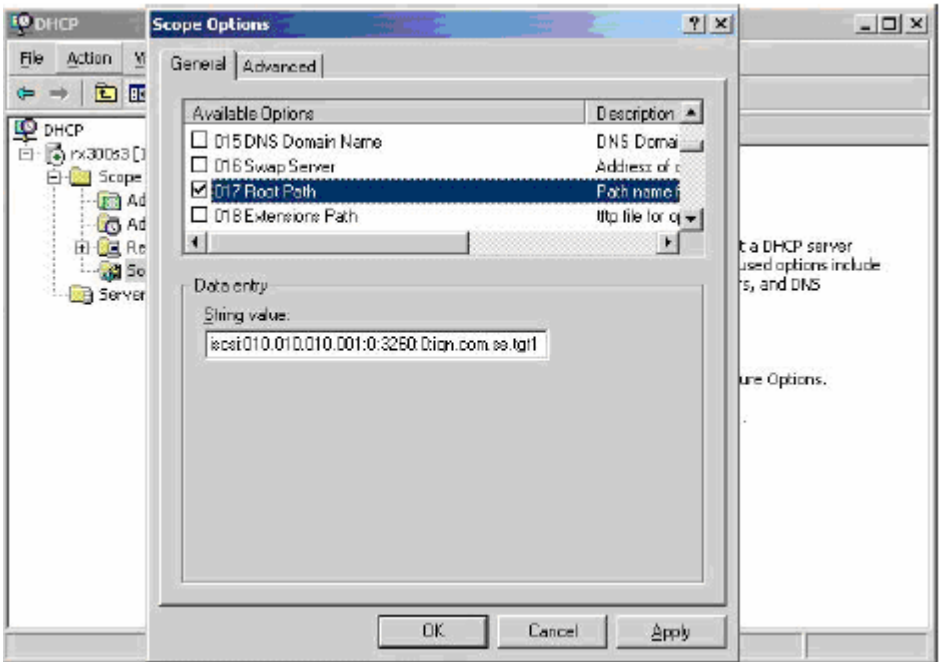

Figure 10-13 DHCP Server Scope Options

3. In the String Value field, add the location of the iSCSI target you want to use for iSCSI boot. Enter the string in the following format:

   ```
   iscsi: <ipaddress>:<protocol>:<iscsi port number>:<luns><target name>
   ```

   For example:

   ```
   iscsi:010.010.010.001:0:3260:0:iqn.1992-08.com.netap:sn.15729740
   ```

4. Click **Apply**. The DHCP server screen is ready to discover boot targets.

Enabling DHCP Discovery Through the iSCSISelect Utility

If the DHCP server supports DHCP discovery and you added the root path to the DHCP server, you can enable boot target discover using DHCP with the iSCSISelect utility. By enabling Discover IPv4 Boot Target via DHCP, you can use DHCP discovery to provide the boot path from the DHCP server.

Note: If you leave Discover IPv4 Boot Target via DHCP disabled (default), you must manually configure iSCSI boot.

To enable DHCP discovery through iSCSISelect:

1. After configuring the iSCSI Initiator Name, select **Controller Properties** from the Controller Configuration screen (Figure 10-1 on page 114) and press **<Enter>**.
2. From the Controller Properties screen, select **Discover IPv4 Boot Target via DHCP** and press **<Enter>**. A pop-up menu is displayed.

3. To enable the function, select **Enabled** and press **<Enter>**.
4. Select **Save** and press **<Enter>**.

11. Configuring UEFI for Ethernet

UEFIBoot supports:

- UEFI version – 2.3.1 compatible drivers (backward compatible with 2.1)
- EDK2 compatible drivers
- The following UEFI protocols:
  - NII protocol
  - Configuration Access protocol
  - Component Name2 protocol
  - Driver Diagnostics protocol
  - Platform to Driver Configuration protocol
  - Firmware Management Protocol
- Switching of personalities from the HII menus using the multi-mode feature
- Enabling, disabling, and configuring UMC from HII
- Lenovo Blade Open Firmware Management Protocol and Universal Configuration Manager

  Note: Applies to IBM products only.

- Up to 96 physical adapters or 192 ports
- Single driver – support for all adapters in the system

This version of UEFIBoot is loaded from flash into system memory.

For more information on loading and unloading UEFIBoot, see appendix E., "Loading and Unloading UEFIBoot from the UEFI Shell," on page 267.

If UEFIBoot is loaded in a UEFI Shell, type "`drivers`" and press **<Enter>** to see if the driver is loaded.

Note: If you are using a Dell adapter, see appendix F., "Dell UEFI," on page 268 for information on using the Dell UEFI utility.

Navigating the Emulex NIC Configuration Utility

Use the following methods to navigate the Emulex NIC configuration utility:

- Press the up/down arrows on the keyboard to move through menu options or fields. If multiple adapters are listed, use the up/down arrows to scroll to the additional adapters.
- Press the **<+>**, **<->**, or **<Enter>** keys to change numeric values.
- Press **<Enter>** to select a menu option, to select a row in a configuration screen, or to change a configuration default.
- Use the navigation entries on the page to move about the utility.
- Press **<Esc>** to exit the current screen and show the previous screen.

Note: HP adapters in HP systems use the F10 key to save the current configuration settings.

Starting the Emulex NIC Configuration Utility

Depending on the vendor UEFI configuration, the Emulex NIC configuration utility may appear under different setup menus in the vendor system firmware or BIOS (such as **System Settings > Network**).

To start the Emulex NIC configuration utility using the HII:

1. The Network screen (Figure 11-1 on page 128) shows a list of the adapters in the system. Your list may vary depending on the installed adapters.

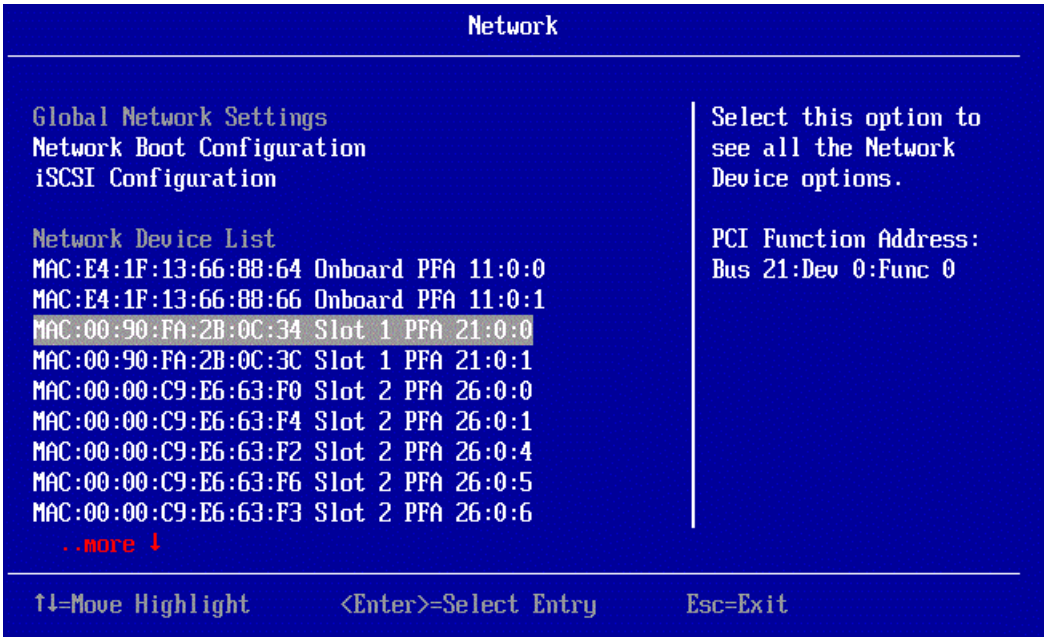

Figure 11-1 Network Screen

2. Select an adapter and press **<Enter>**. The Emulex NIC Selection screen (Figure 11-2 on page 129) is displayed.

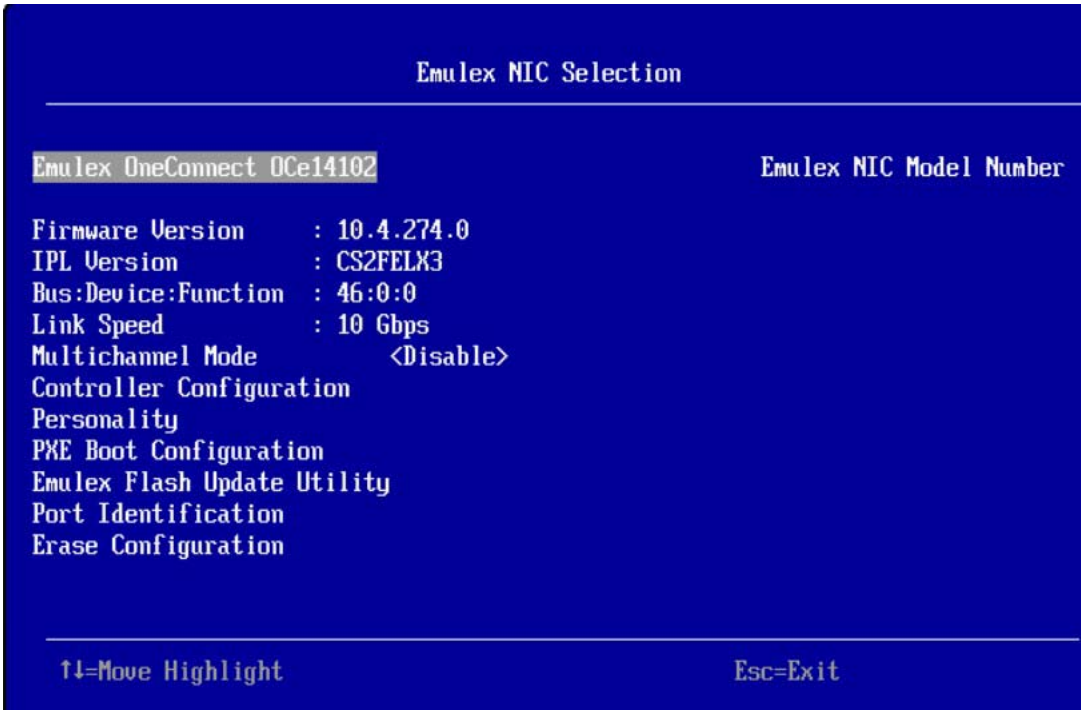

Figure 11-2 Emulex NIC Selection Screen

The Emulex NIC Selection screen shows the following adapter information and configuration options:

Note: Some of the following options may or may not appear depending on your adapter and the system in which it is installed.

- Firmware Version – the current firmware version installed on the adapter. The firmware version is the same as the boot version.
- IPL Version – the current version installed on the adapter.
- Bus:Device:Function – the PCI bus, device, and function for the adapter. This information describes the location of the adapter in the PCI configuration space.
- Link Speed – the current maximum port speed on the adapter.
- Advanced Mode (not shown) – see "Advanced Mode Support" on page 130 for more information.
- Multichannel Mode – see "Configuring Universal Multi-Channel" on page 149 for more information.
- Controller Configuration – the available menu options depend on whether UMC is enabled or disabled. See "Configuring the Adapter If UMC is Disabled or Not Supported" on page 145 or "Configuring Universal Multi-Channel" on page 149 for more information.
- Boot Mode – see "Configuring Boot Mode" on page 132 for more information.

Note: If the system BIOS supports boot mode configuration, this feature is not displayed in the menu.

- iBFT Configuration - this menu is available only if Boot Mode is disabled. See "Configuring iBFT" on page 132 for more information.

  Note: If the system BIOS supports iBFT configuration, this feature is not displayed in the menu.

- Personality – see "Configuring Personality" on page 139 for more information.
- PXE Boot Configuration – this option is available for HP adapters in HP systems only. See "Configuring PXE Boot Settings" on page 143 for more information.
- Emulex Flash Update Utility – see "Downloading Firmware and Boot Code" on page 161 for more information.
- Port Identification – see "Identifying a Port" on page 163 for more information.
- Erase Configuration – see "Erasing Ports and Adapter Configurations" on page 164 for more information.

  Note: The Erase Configuration option is not available on HP adapters in HP systems. Instead, use the F7 key to reset the configuration settings to their factory default settings.

Advanced Mode Support

Advanced Mode is a driver compatibility option. With Advanced Mode enabled, you can run Advanced Mode-aware drivers that provide advanced capabilities as listed in Table 11-1. With Advanced mode disabled, you can run older legacy inbox drivers that are not Advanced Mode-aware with the latest firmware versions.

Notes

- Advanced Mode support is enabled by default on OCe11100-series two-port and four-port adapters and the LPe16202/OCe15100 CNA. On four-port adapters, the Advanced Mode setting is not provided in the HII utilities. The Advanced Mode setting on these platforms is implicitly enabled and Advanced Mode-aware drivers must be installed. Compatibility with legacy drivers requires that Advanced Mode support be disabled on two-port adapters.
- Advanced Mode is automatically enabled on OCe14000-series adapters and it cannot be disabled.

Table 11-1 Advanced Mode Capabilities (by Operating System)

Operating System	Advanced Mode Enabled	Advanced Mode Disabled (Legacy Mode)
Windows	16 RSS queues **Note:** Supported on Windows 2008 R2 and later only.	4 RSS queues
	VMQ lookahead split **Note:** VMQs are supported on Windows Server 2008 R2 and later only.	Lookahead split is silently ignored. A small performance penalty for VMQs may occur.
Linux and Citrix	16 RSS queues	4 RSS queues
	VFs and PFs can be increased up to 30	
VMware ESXi	For both 1500 and 9000 MTU: 16 NetQueues per PF in non-VFA 4 NetQueues per PF in VFA	1500 MTU – 8 NetQueues per PF in non-VFA and 4 NetQueues per PF in VFA. 9000 MTU – 4 NetQueues per PF in both VFA and non-VFA

To configure Advanced Mode support:

Note: Changing the Advanced Mode setting requires a reboot.

1. On the Emulex NIC Selection screen (Figure 11-3 on page 131), select **Advanced Mode** and press **<Enter>**. The Advanced Mode pop-up menu is displayed.

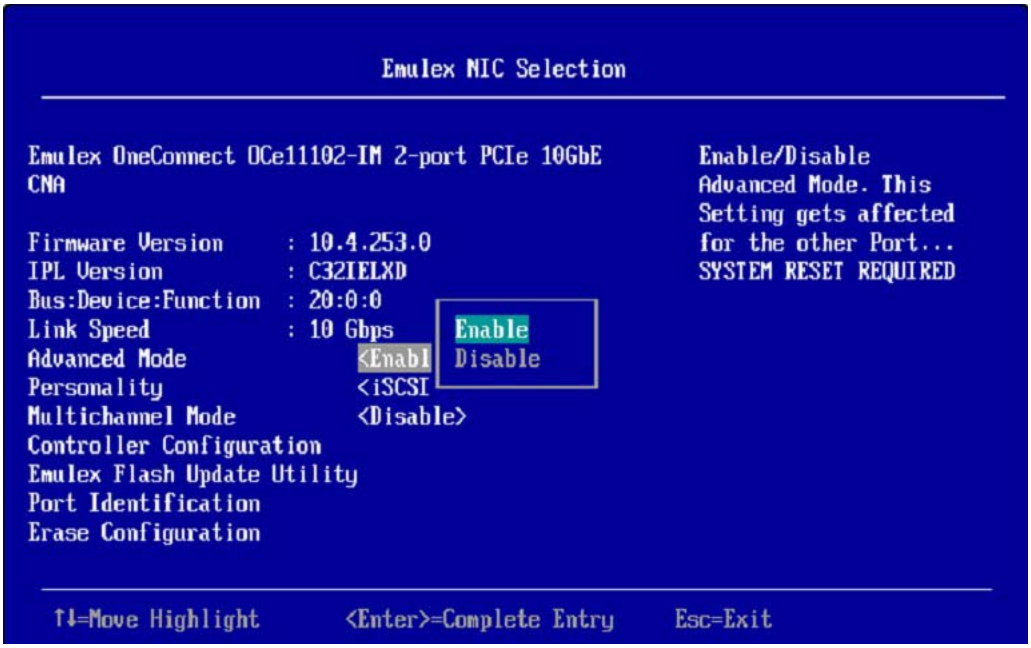

Figure 11-3 Emulex NIC Selection Screen With Advanced Mode Displayed

2. Select **Enable** or **Disable** and press **<Enter>**.
3. Reboot the system.

Configuring Boot Mode

This setting configures the boot mode.

- Enable – iSCSI hardware initiator boot mode
- Disable – iSCSI software initiator boot mode

Note: If boot mode is disabled, the iBFT Configuration menu is available.

To configure boot mode:

1. On the Emulex NIC Selection screen (Figure 11-2 on page 129), select **Boot Mode** and press **<Enter>**. The Boot Mode pop-up menu is displayed.
2. Select **Enable** or **Disable** and press **<Enter>**.

Configuring iBFT

Note: Boot mode must be set to "Disable" to access the iBFT Configuration menu.

iSCSI configuration through the NIC interface (iBFT) is exactly the same as normal iSCSI configuration except it is performed through the NIC interface. In order for this to occur, you must use the operating system's NIC driver and an iBFT-aware operating system.

To configure iBFT:

1. On the Emulex NIC Selection screen (Figure 11-2 on page 129), select **iBFT Configuration** and press **<Enter>**.

   The iBFT Configuration screen (Figure 11-4 on page 132) is displayed.

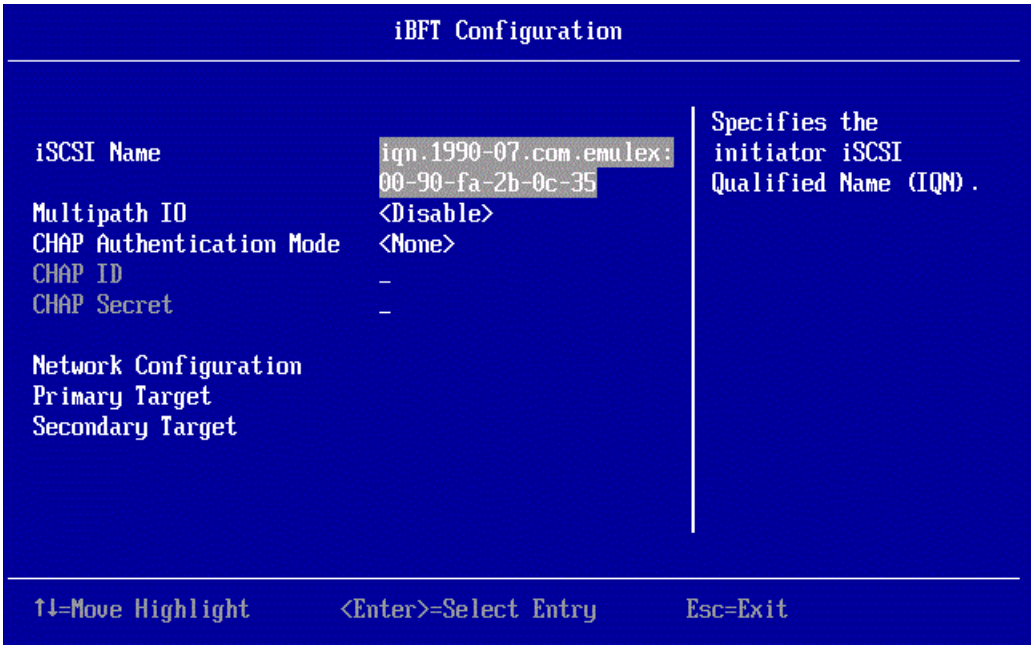

Figure 11-4 iBFT Configuration Screen

The iBFT Configuration screen enables you to perform the following tasks:

- Edit the iSCSI initiator name
- Enable multipath I/O
- Configure the CHAP authentication mode
- Configure the network settings
- Configure the primary or secondary targets

After you have completed the iBFT configuration, save your changes.

To save changes:

1. Press **<Esc>** to return to the Emulex NIC Selection screen (Figure 11-2 on page 129).
2. Select **Save Changes** and press **<Enter>**.

Changing the iSCSI Name

To edit the iSCSI initiator name:

1. On the iBFT Configuration screen (Figure 11-4 on page 132), highlight **iSCSI Name** and press **<Enter>**.

   This is a global setting. The iSCSI initiator name configured on one adapter is reflected on all adapters in the system.

   Note: HP systems are an exception to the previous statement. Each port on an HP system can be configured with a unique initiator name.

Selecting MPIO

MPIO support allows the initiator to log in dual sessions to the same target. In this way I/O can be sent over either TCP/IP connection to the target. If one session fails another session can continue processing I/O without interruption to the application. In iSCSI target configuration, you have the option of setting dual network paths to a single boot LUN.

Note: Although MPIO boot support allows the initiator to log into multiple sessions, the iSCSI BIOS currently limits the number of sessions to two iSCSI sessions for a single boot LUN.

You must follow these steps in this order to configure MPIO boot support for each operating system.

1. Use the Emulex iSCSI configuration utility to configure the first path to a boot target.
2. Complete normal operating system installation.
3. Install third-party MPIO software for your operating system.
4. Configure the second path to a single boot LUN through the Emulex iSCSI configuration utility.

To configure MPIO:

1. On the iBFT Configuration screen (Figure 11-4 on page 132), select **Multipath IO** and press **<Enter>**. The Multipath IO pop-up menu is displayed.

2. Select **Enable** or **Disable** and press **<Enter>**.

Configuring CHAP Authentication Mode

Emulex uses CHAP to authenticate initiators and targets for added network security. By using a challenge and response security mechanism, CHAP periodically verifies the initiator's identity. This authentication method depends on a secret key known to the initiator and the target only. Although the authentication can be one-way, you can negotiate CHAP in both directions with the help of the same secret set for mutual authentication. You must make sure however, that what you configure on the target side matches the initiator side. Emulex supports both one-way and mutual authentication.

To configure the CHAP authentication method:

1. On the iBFT Configuration screen (Figure 11-4 on page 132), select **CHAP Authentication Mode** and press **<Enter>**. The CHAP Authentication Mode pop-up menu is displayed.
2. Select **None**, **One-way CHAP**, or **Mutual CHAP** and press **<Enter>**.
   - One-way CHAP – With one-way CHAP authentication, the target authenticates the initiator. Use one-way CHAP authentication for a one-way challenge and response security method – you must configure the CHAP ID and CHAP Secret, which is authenticated by the target.
   - Mutual CHAP – With mutual CHAP authentication, the target authenticates the initiator and the initiator authenticates the target. Use mutual CHAP authentication for a two-way challenge and response security method – you must configure different CHAP and mutual CHAP IDs and CHAP secrets.

   Note: If you configure the CHAP parameters, verify that those parameters match the parameters on the storage side.

3. Enter the appropriate CHAP ID and CHAP Secret and press **<Enter>**.

Configuring Network Settings

To configure the network settings:

1. On the iBFT Configuration screen (Figure 11-4 on page 132), select **Network Configuration** and press **<Enter>**. The Network Configuration screen (Figure 11-5

on page 135) is displayed.

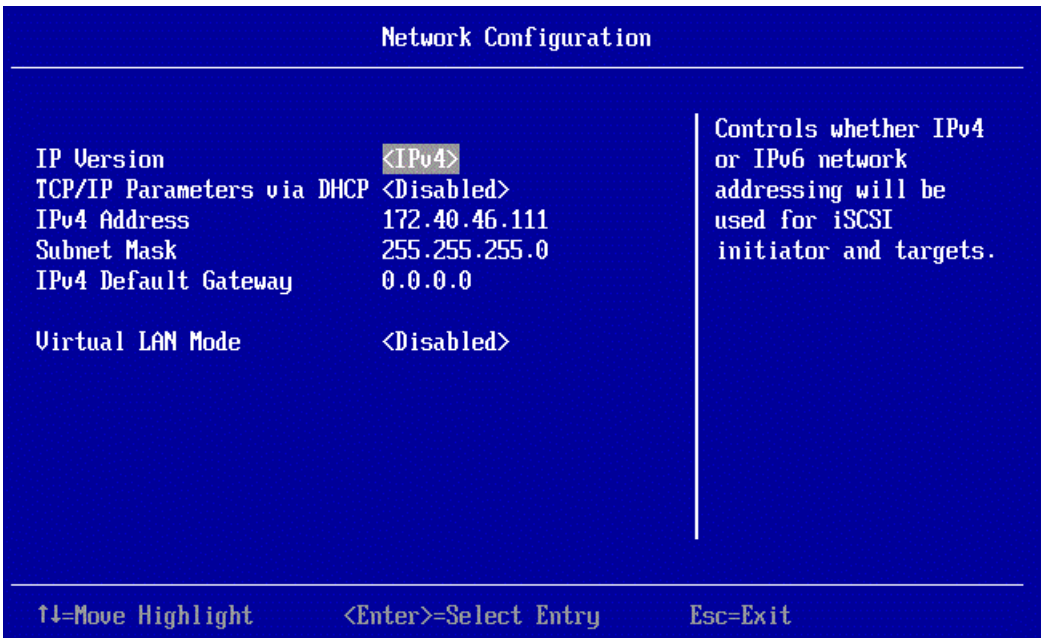

Figure 11-5 Network Configuration Screen

The Network Configuration screen enables you to perform the following tasks:

- Configure the initiator's IP version
- Configure TCP/IP parameters using DHCP

  Note: This option is available only if IPv4 is selected as the IP version.

- Configure iSCSI parameters using DHCP

  Note: This option is available only if TCP/IP Parameters via DHCP is enabled.

- Select the virtual LAN mode

After you have completed the network configuration, save your changes.

To save changes:

1. Press **<Esc>** to return to the iBFT Configuration screen (Figure 11-4 on page 132).
2. Press **<Esc>** again to return to the Emulex NIC Selection screen (Figure 11-2 on page 129).
3. Select **Save Changes** and press **<Enter>**.

Configuring the Initiator IP Version

To configure the initiator's IP version:

1. On the Network Configuration screen (Figure 11-5 on page 135), select **IP version** and press **<Enter>**. The IP Version pop-up menu is displayed.
2. Select **IPv4**, **IPv6**, or **None** and press **<Enter>**.

Configuring TCP/IP Parameters Using DHCP

Note: This option is available only if IPv4 is selected as the IP Version.

This option controls the source of the initiator's IP address through DHCP or static assignment.

To configure TCP/IP parameters using DHCP:

1. On the Network Configuration screen (Figure 11-5 on page 135), select **TCP/IP Parameters via DHCP** and press **<Enter>**. The TCP/IP Parameters via DHCP pop-up menu is displayed.
2. Select **Enabled** or **Disabled** and press **<Enter>**.
3. If this setting is disabled, you must enter the following information for the iSCSI initiator:
   - IPv4 address
   - Subnet mask
   - IPv4 default gateway

Configuring iSCSI Parameters Using DHCP

Note: This option is available only if TCP/IP Parameters via DHCP is enabled.

This option enables you to retrieve the iSCSI target parameters using DHCP.

To configure iSCSI parameters using DHCP:

1. On the Network Configuration screen (Figure 11-5 on page 135), select **iSCSI Parameters via DHCP** and press **<Enter>**. The iSCSI Parameters via DHCP pop-up menu is displayed.
2. Select **Enabled** or **Disabled** and press **<Enter>**.

Selecting Virtual LAN Mode

If virtual LAN mode is enabled, a VLAN tag can be used by iSCSI boot.

To enable virtual LAN mode:

1. On the Network Configuration screen (Figure 11-5 on page 135), select **Virtual LAN Mode** and press **<Enter>**. The Virtual LAN Mode pop-up menu is displayed.
2. Select **Enabled** and press **<Enter>**.

Configuring the Primary and Secondary Targets

To configure the iSCSI target parameters:

1. On the iBFT Configuration screen (Figure 11-4 on page 132), select **Primary Target** or **Secondary Target** and press **<Enter>**.

   Note: Configuration of the primary and secondary targets is identical. For this reason, this section covers the configuration of the primary target only.

The Primary Target screen (Figure 11-6 on page 137) is displayed.

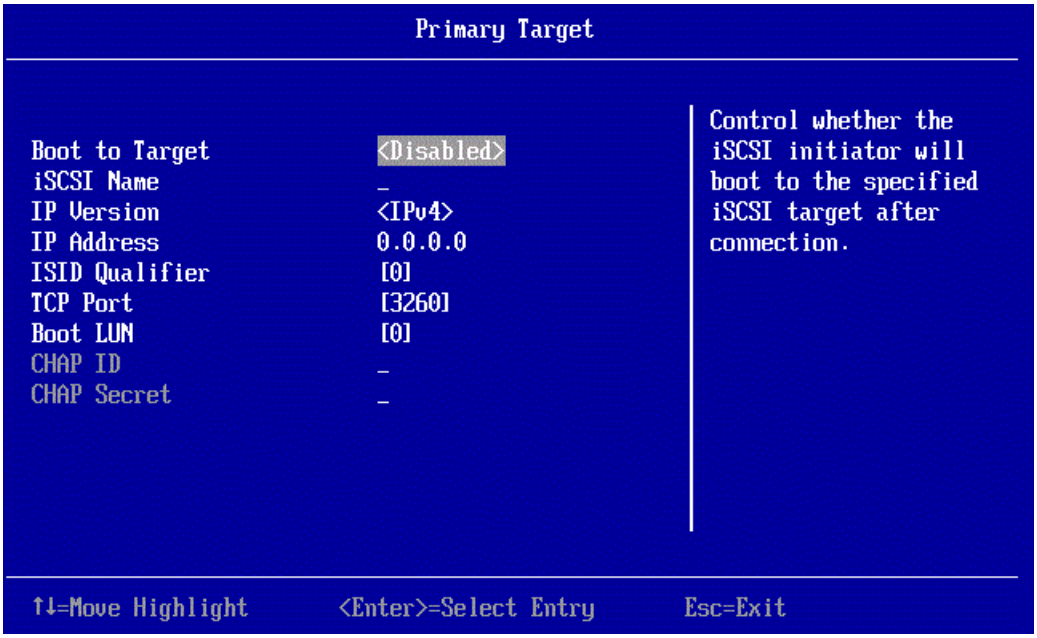

Figure 11-6 Primary Target Screen

The Primary Target screen enables you to configure the following items:

- Boot target
- iSCSI target name
- Target's IP version
- Target's IP address
- Target's ISID qualifier
- Target's TCP port
- Target's boot LUN
- Target's CHAP ID and secret

Note: These options are available only if the initiator's CHAP authentication mode has been properly set.

After you have completed the primary or secondary target configuration, you must save your changes.

To save changes:

1. Press **<Esc>** to return to the Emulex NIC Selection screen (Figure 11-2 on page 129).
2. Select **Save Changes** and press **<Enter>**.

Configuring the Boot Target

Note: Only one boot target can be enabled at a time. If the primary target has the boot target setting enabled, the secondary target must have the boot target setting disabled.

To configure the boot target:

1. On the Primary Target screen (Figure 11-6 on page 137), select **Boot to Target** and press **<Enter>**. The Boot to Target pop-up menu is displayed.
2. Select **Enabled** or **Disabled** and press **<Enter>**.

Changing the Target's iSCSI Name

This setting specifies the IQN of the specified target.

To edit the iSCSI target's name:

1. On the Primary Target screen (Figure 11-6 on page 137), select **iSCSI Name** and press **<Enter>**.
2. Edit the target's name and press **<Enter>**.

Configuring the Target's IP Version

To configure the target's IP version:

1. On the Primary Target screen (Figure 11-6 on page 137), select **IP version** and press **<Enter>**. The IP Version pop-up menu is displayed.
2. Select **IPv4** or **IPv6** and press **<Enter>**.

Configuring the Target's IP Address

To configure the target's IP address:

1. On the Primary Target screen (Figure 11-6 on page 137), select **IP Address** and press **<Enter>**.
2. Enter the target's IP address and press **<Enter>**.

Configuring the Target's ISID Qualifier

If you are connecting dual sessions to the same target portal group, enter a unique ISID Qualifier, which can be any number up to 65535. For more information on when an ISID value must be changed, see "Booting from SAN for iSCSI MPIO" on page 75.

To configure the target's ISID qualifier:

1. On the Primary Target screen (Figure 11-6 on page 137), select **ISID Qualifier** and press **<Enter>**.
2. Enter the target's ISID qualifier value and press **<Enter>**.

Configuring the Target's TCP Port

To configure the target's TCP port:

1. On the Primary Target screen (Figure 11-6 on page 137), select **TCP Port** and press **<Enter>**.
2. Enter the target's TCP port value and press **<Enter>**.

Configuring the Target's Boot LUN

To configure the target's boot LUN:

1. On the Primary Target screen (Figure 11-6 on page 137), select **Boot LUN** and press **<Enter>**.
2. Enter the target's boot LUN value and press **<Enter>**.

Configuring the Target's CHAP ID and Secret

Note: These options are available only if the initiator's CHAP authentication mode has been properly set.

To configure the target's CHAP ID and secret:

1. Ensure that the initiator's CHAP authentication mode is properly set.
2. On the Primary Target screen (Figure 11-6 on page 137), select **CHAP ID** and press **<Enter>**.
3. Enter the target's CHAP ID value and press **<Enter>**.
4. On the Primary Target screen (Figure 11-6 on page 137), select **CHAP Secret** and press **<Enter>**.
5. Enter the target's CHAP secret value and press **<Enter>**.

Configuring Personality

The "personality" reflects the protocol or protocols of the adapter. This option specifies a list of available protocols that can be configured on an adapter. Depending on the personalities for which the adapter is licensed, one or more of the following selections is displayed:

- NIC – The NIC personality implies that all the enabled functions provide NIC/TOE functionality.

  Note: TOE functionality is not supported on OCe14000-series adapters.

- iSCSI or FCoE – these personalities are enabled on one function per adapter port and include NIC functionality on the other enabled functions. Only one of each storage protocol is allowed on each port.
- NIC+RoCE – For more information on the NIC+RoCE personality, see "Selecting the NIC+RoCE Personality" on page 141.

  Note: The NIC+RoCE personality is available only on OCe14000-series adapters running Windows or Linux with both UMC and SR-IOV disabled.

- Custom – For more information on the Custom personality, see "Selecting the Custom Personality" on page 142.

The menu displays the available personalities only, including both free and licensed personalities.

To view the personalities supported on the adapter:

1. Select **Personality** on the Emulex NIC Selection screen (Figure 11-2 on page 129), and then press **<Enter>**. The Personality Selection screen (Figure 11-7 on page 140) is displayed.
2. Select the current personality setting and press **<Enter>**. A pop-up menu is displayed with a list of available personalities.

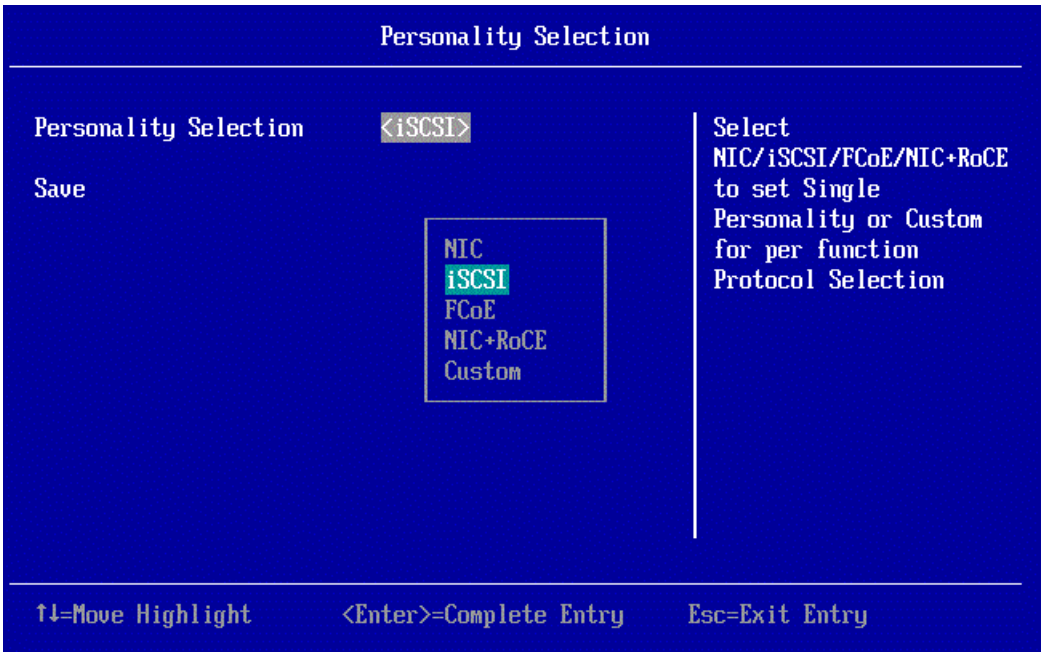

Figure 11-7 Personality Selection Screen with Pop-up Menu

To change the personality of the adapter:

1. On the Personality Selection pop-up menu (Figure 11-7 on page 140) select the desired personality and press **<Enter>**.
2. Select **Save** and press **<Enter>.**

Note: Additional configuration changes can be made after changing the Personality setting; however, a reboot is required before the new Personality setting will take effect.

Selecting the NIC+RoCE Personality

Note: The NIC+RoCE personality is available only on OCe14000-series adapters running Windows or Linux with both UMC and SR-IOV disabled.

The NIC+RoCE personality implies that all the enabled functions provide RoCE functionality.

If NIC+RoCE is enabled, you must select a NIC+RoCE profile. The NIC+RoCE profile allows you to select the appropriate profile for your particular system setup.

- For NFS on Linux, choose the RoCE-1 profile.
- For SMB Direct on Windows Server 2012 and Windows Server 2012 R2, choose the RoCE-2 profile.

Note: Check the Implementer's Lab on the Emulex website for any updated information on additional use cases.

To select the NIC+RoCE personality:

1. From the Personality Selection screen (Figure 11-7 on page 140), select **NIC+RoCE** and press **<Enter>**. The NIC+RoCE Profile pop-up menu (Figure 11-8 on page 141) is displayed.

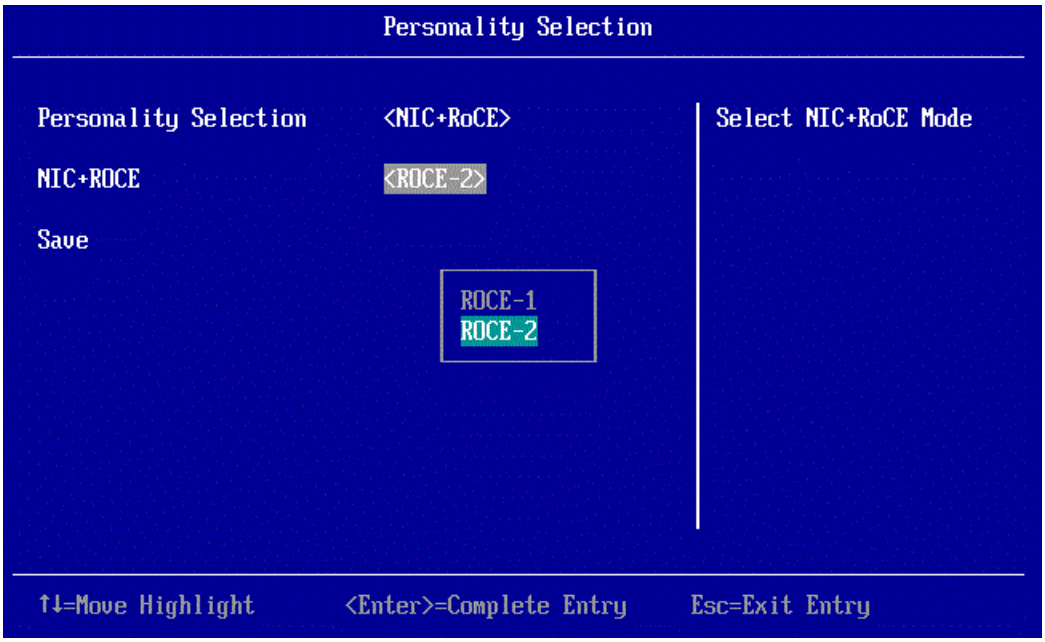

Figure 11-8 NIC+RoCE Profile Screen with Pop-Up Menu

2. Select the desired NIC+RoCE profile and press **<Enter>**.
3. Select **Save** and press **<Enter>.**

Note: Additional configuration changes can be made after changing the Personality setting; however, a reboot is required before the new Personality setting will take effect.

Selecting the Custom Personality

The Custom personality allows you to select the protocol type for each function. iSCSI and FCoE personalities can be enabled on only one function per adapter port.

Note: Two iSCSI functions and two FCoE functions are not allowed on a single port.

To select the Custom personality:

1. From the Personality Selection screen (Figure 11-7 on page 140), select **Custom** and press **<Enter>**. The Custom Personality Selection screen (Figure 11-9 on page 142) is displayed.

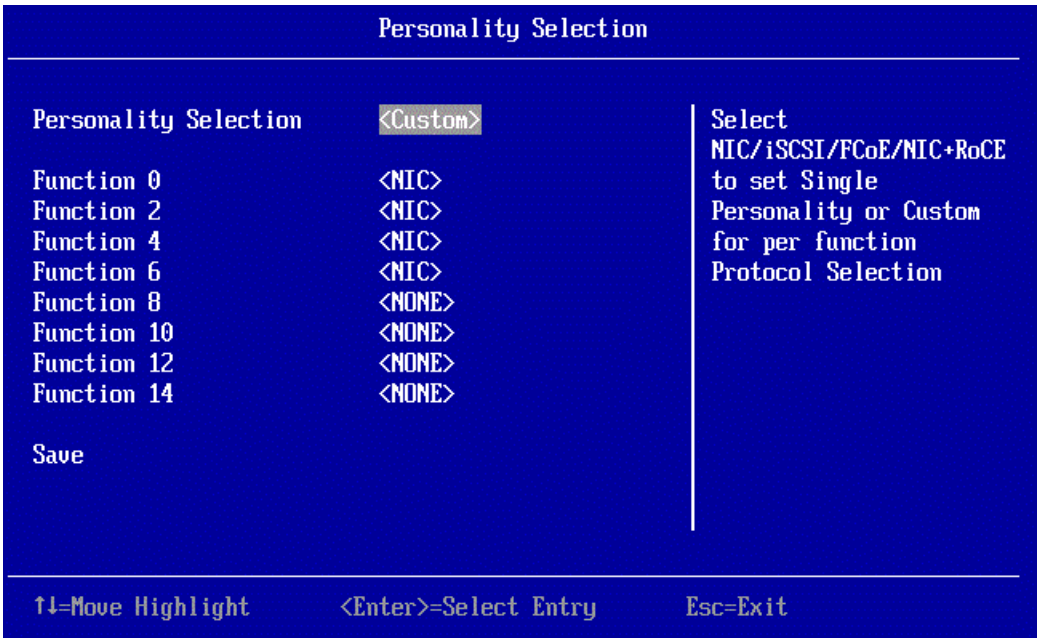

Figure 11-9 Custom Personality Selection Screen

2. Select the desired personality for the appropriate function from the pop-up menu and press **<Enter>**.
3. Select **Save** and press **<Enter>.**

Note: Additional configuration changes can be made after changing the Personality setting; however, a reboot is required before the new Personality setting will take effect.

Configuring PXE Boot Settings

To view the PXE boot settings for the adapter:

1. Select **PXE Boot Configuration** on the Emulex NIC Selection screen (Figure 11-2 on page 129), and then press **<Enter>**. The PXE Boot Configuration screen (Figure 11-10 on page 143) is displayed.

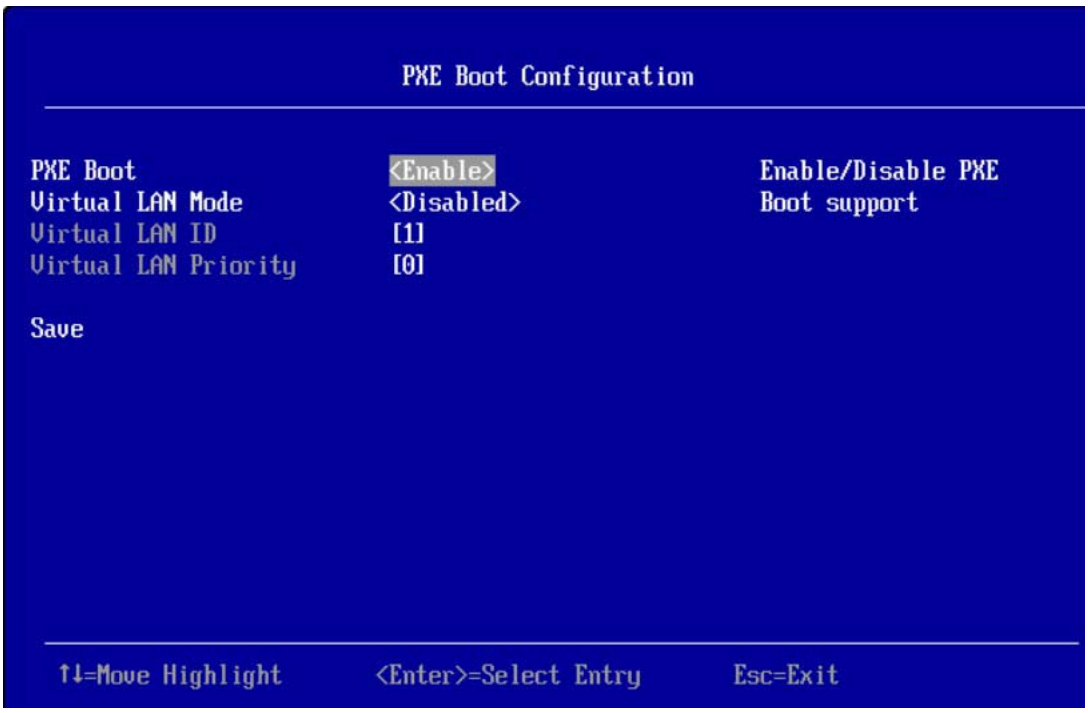

Figure 11-10 PXE Boot Configuration Screen

The PXE Boot Settings screen enables you to perform the following tasks:

- Enable or disable PXE boot
- Enable or disable VLAN mode
- Configure the VLAN ID
- Configure the VLAN priority

Enabling or Disabling PXE Boot

To configure PXE boot support:

1. On the PXE Boot Configuration screen (Figure 11-10 on page 143), use the up or down arrow keys to highlight the current PXE Boot setting.
2. Use the left or right arrow keys to enable or disable the PXE Boot setting.
3. Select **Save** and press **<Enter>.**

Note: If PXE boot is enabled, during system startup PXE contacts the DHCP server for an IP address to boot from the network.

Enabling or Disabling VLAN Mode

To configure the VLAN mode:

1. On the PXE Boot Configuration screen (Figure 11-10 on page 143), use the up or down arrow keys to highlight the current Virtual LAN Mode setting.
2. Use the left or right arrow keys to enable or disable the Virtual LAN Mode setting.
3. Select **Save** and press **<Enter>.**

Configuring the VLAN ID

Note: Virtual LAN Mode must be enabled in order to configure this feature.

To configure a VLAN ID:

1. On the PXE Boot Configuration screen (Figure 11-10 on page 143), use the up or down arrow keys to highlight the current Virtual LAN ID setting.
2. Use the left or right arrow keys to select a number from 1 to 4094.
3. Select **Save** and press **<Enter>.**

Configuring the VLAN Priority

Note: Virtual LAN Mode must be enabled in order to configure this feature.

To set the VLAN priority level:

1. On the PXE Boot Configuration screen (Figure 11-10 on page 143), use the up or down arrow keys to highlight the current Virtual LAN Priority setting.
2. Use the left or right arrow keys to select a number from 0 to 7.

   This unique value assigns a priority to outbound packets containing a specified VLAN ID. Valid values range from 0 to 7, with 0 being the highest priority level.
3. Select **Save** and press **<Enter>.**

Configuring the Adapter If UMC is Disabled or Not Supported

Note: If UMC is enabled on Emulex or HP adapters, see "Configuring Universal Multi-Channel" on page 149. If you are using an IBM adapter, see "Configuring Multi-Channel for IBM Adapters" on page 154.

If UMC is disabled, or it is not supported, the Controller Configuration screen (Figure 11-11 on page 145) is displayed when you select **Controller Configuration** on the Emulex NIC Selection screen (Figure 11-2 on page 129).

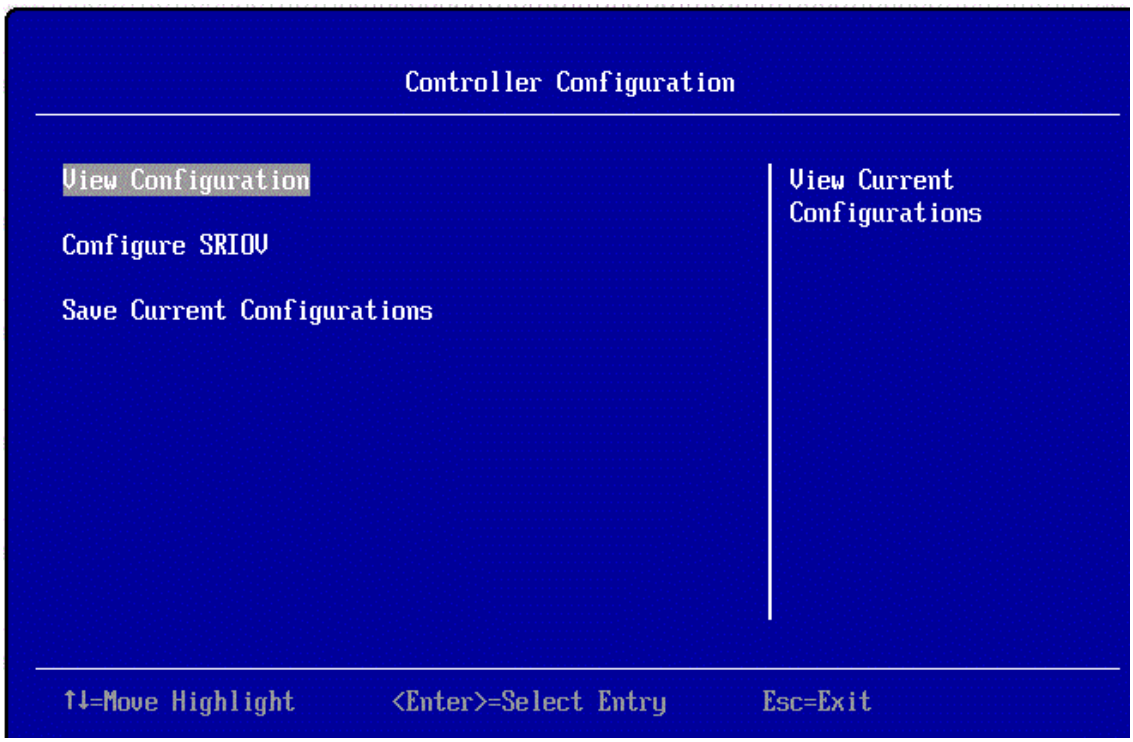

Figure 11-11 Controller Configuration Screen (UMC Disabled)

The Controller Configuration screen enables you to perform the following tasks:

- View the current configuration
- Configure SR-IOV
- Configure NIC Mode

  Note: This setting is available only if SR-IOV is enabled, the Personality Selection is set to "NIC", and a two-port OCe14000-series adapter is in use.

- Save the current configuration

Viewing the Configuration

To view the current configuration:

1. On the Controller Configuration screen (Figure 11-11 on page 145), select **View Configuration** and press **<Enter>**. The View Configuration screen (Figure 11-12 on page 146) is displayed.

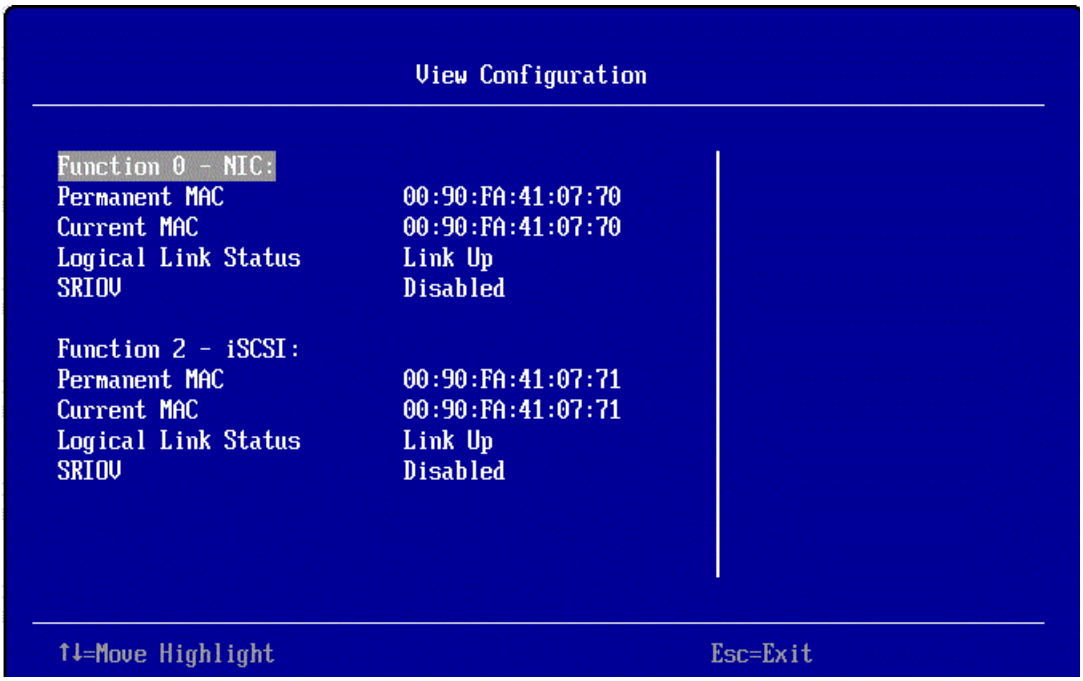

Figure 11-12 View Configuration Screen

From the View Configuration screen, you can view information for that specific function, including the permanent and current MAC addresses, the logical link status, and the SR-IOV status for NIC functions.

2. When you are finished viewing the configurations, press **<Esc>** to return to the Controller Configuration screen.

Configuring SR-IOV

If the system BIOS supports SR-IOV, you can enable it. SR-IOV support can only be enabled if UMC is disabled or it is not supported.

Notes

- SR-IOV is not supported with the NIC+RoCE personality.
- SR-IOV is only available for NIC functions and not for storage (iSCSI or FCoE) functions.

To configure SR-IOV:

1. On the Controller Configuration screen (Figure 11-11 on page 145), select **Configure SRIOV** and press **<Enter>**. The Configure SRIOV screen (Figure 11-13 on page 147) is displayed.

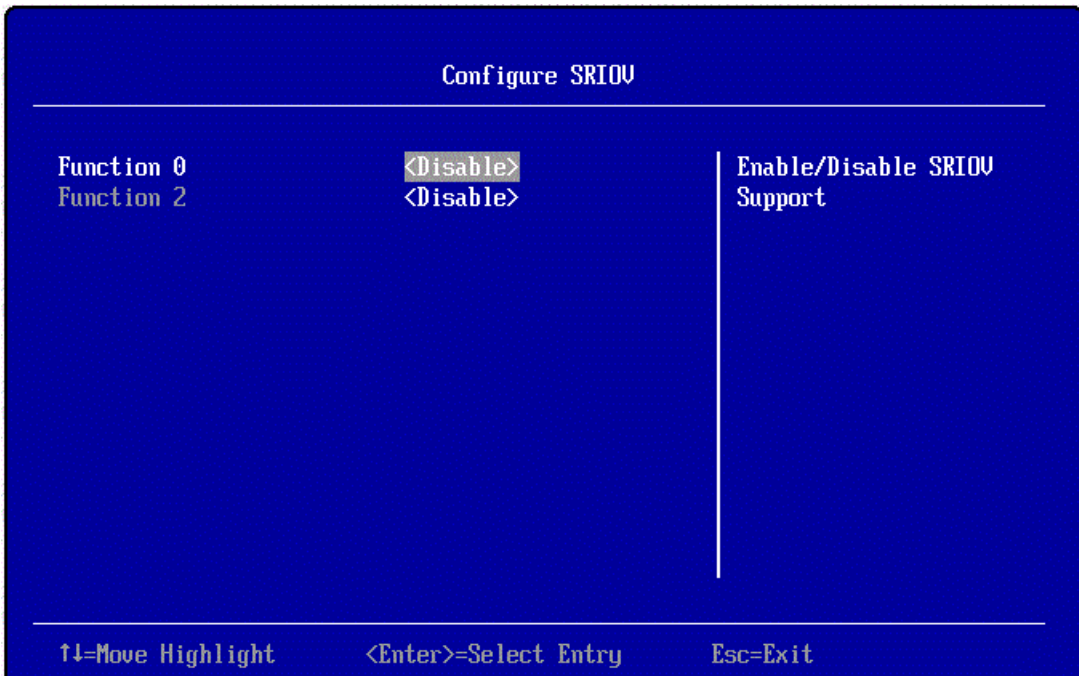

Figure 11-13 Configure SRIOV Screen

2. Select the current setting for a particular NIC function and a pop-up menu is displayed.
3. Select **Enable** or **Disable** and press **<Enter>**.
4. When you are finished, press **<Esc>** to return to the Controller Configuration screen.

For more information on SR-IOV configuration, see the appropriate Emulex driver manual.

Configuring NIC Mode

Note: This setting is available only if SR-IOV is enabled, the Personality Selection is set to "NIC", and a two-port OCe14000-series adapter is in use.

This setting allows you to control the VF count on a two-port OCe14000-series adapter. The choices include:

- NIC Only Profile – the VF count is restricted to 31 VFs per port and QoS is supported for those VFs.
- NIC-ETS Disabled – the VF count is set to 63 VFs per port but QoS is not supported for those VFs.

To select the NIC Mode:

1. From the Configure SRIOV screen (Figure 11-13 on page 147), select the **NIC Mode** setting for a particular NIC function and a pop-up menu is displayed.

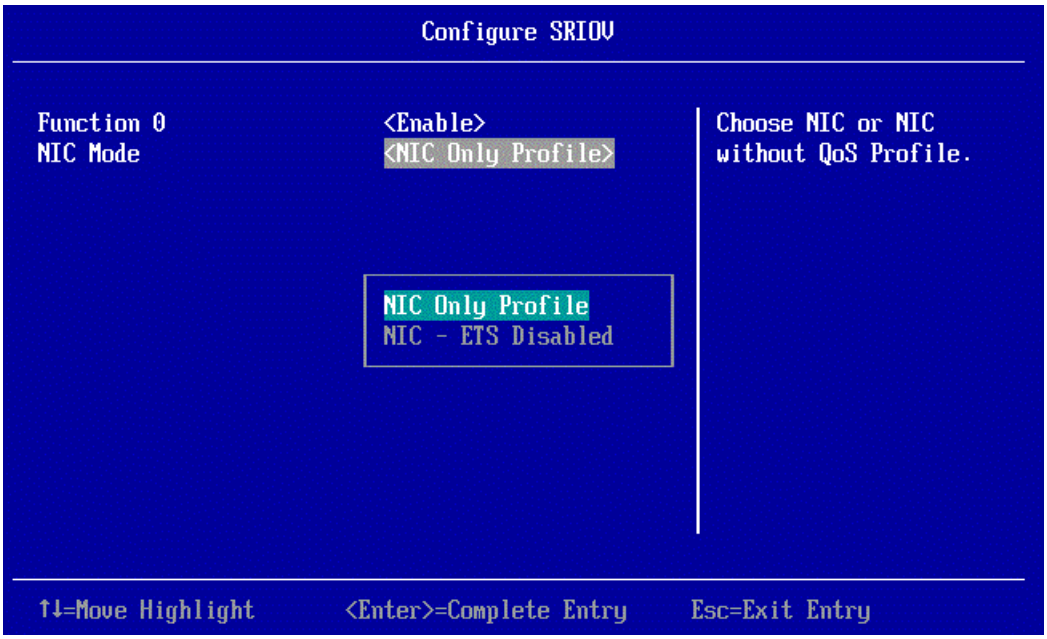

Figure 11-14 Configure NIC Mode Pop-up Menu

2. Select **NIC Only Profile** or **NIC-ETS Disabled** and press **<Enter>**.
3. When you are finished, press **<Esc>** to return to the Controller Configuration screen.

Saving the Current Configuration

To save the configuration changes, on the Controller Configuration screen (Figure 11-11 on page 145), select **Save Current Configurations** and press **<Enter>**.

Configuring Universal Multi-Channel

UMC provides the ability to configure multiple PCI functions or I/O channels for each adapter port. For additional information on UMC support, see the *Emulex Universal Multi-Channel Reference Guide*.

Notes

- UMC is available on OCe11100-series and OCe14000-series adapters only.
- UMC is supported on HP adapters. It is referred to as FLEX-10.
- If UMC is enabled and the adapter also supports IBM Virtual Fabric Mode or IBM UFP Mode, see "Configuring Multi-Channel for IBM Adapters" on page 154 for additional information. If UMC is disabled or not supported on the adapter, see "Configuring the Adapter If UMC is Disabled or Not Supported" on page 145.
- If UMC is enabled, you must configure the minimum and maximum bandwidths settings for iSCSI and FCoE storage functions in the NIC BIOS before they can be configured through their respective utilities (iSCSI or FCoE BIOS). Otherwise, the Logical Link for that function will still show as down, and you will not be able to log into targets or find LUNs behind those targets.
- UMC functionality is supported on OneConnect adapters running in 10GbE mode only. UMC is not supported in 1GbE mode.

If UMC functionality is supported on the system, the Emulex UEFI NIC utility enables you to perform the following tasks:

- Enable or disable UMC functionality (Multi-Channel mode)
- View the current adapter configuration
- Configure the minimum and maximum bandwidth for each channel
- Configure the LPVID for each channel

Notes

- Your system may not support all UMC options.
- For OCe14000-series adapters, the Emulex NIC configuration utility displays all of the functions on a port, regardless of whether the system supports ARI or not. For additional information on ARI, see "ARI Support" on page 150.

To enable UMC support:

1. On the Emulex NIC Selection screen (Figure 11-2 on page 129), select **Multichannel Mode** and press **<Enter>**. The Multichannel Mode pop-up menu is displayed.
2. Select **Enable** to activate UMC support and press **<Enter>**.

   Note: For HP adapters in HP systems, the Multichannel Mode option is FLEX-10.

To configure the UMC configuration:

1. On the Emulex NIC Selection screen (Figure 11-2 on page 129), select **Controller Configuration** and press **<Enter>**. The Controller Configuration screen (Figure 11-15 on page 150) is displayed.

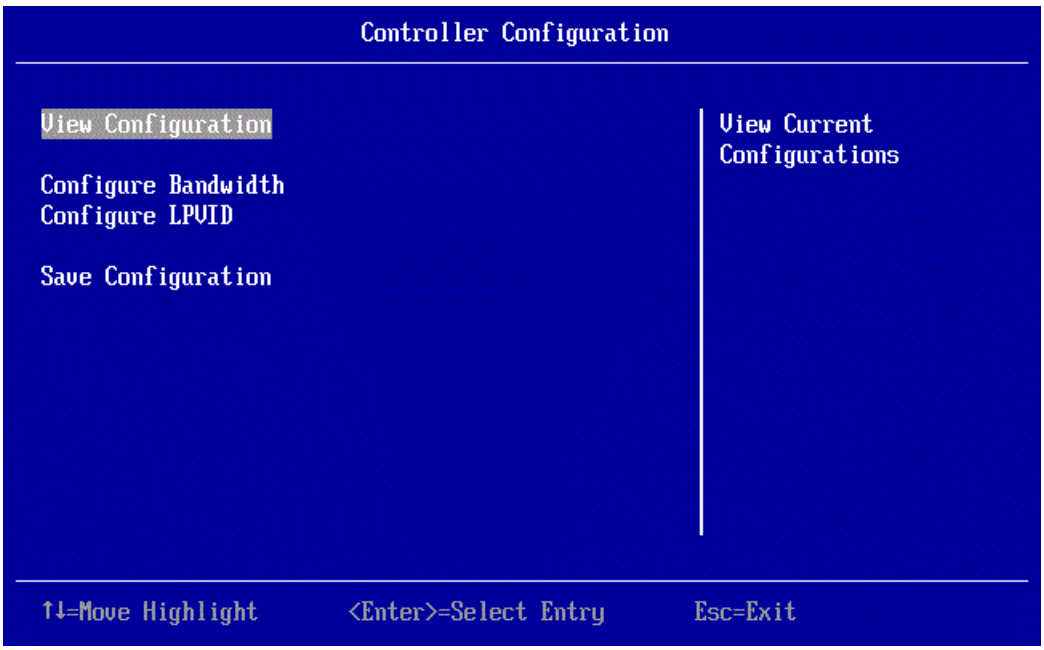

Figure 11-15 Controller Configuration Screen (UMC Enabled)

The Controller Configuration screen enables you to perform the following tasks:

- View the current configuration of each function.
- Configure the minimum and maximum bandwidth percentage.
- Configure the LPVID per function.
- Save the current configuration.

ARI Support

The OCe14000-series adapters support ARI, which provides the ability to configure additional PCI functions or I/O channels for each physical adapter port if UMC is enabled.

You can configure up to 16 functions on a one-port OCe14400-series adapter, up to 8 functions per port on a one or two-port OCe14100-series adapter, and up to 4 functions per port on a four-port OCe14100-series adapter.

The maximum number of functions allowed on an adapter is controlled by the adapter's IPL file and the system's support for ARI.

The following requirements must be met in order to support more than eight functions on an adapter.

- The system hardware (the motherboard and BIOS) must support ARI.
- ARI must be enabled in the system BIOS.
- The host operating system must support ARI:
  - Windows Server 2012 and newer versions
  - RHEL 5.9 and newer versions

- RHEL 6.4 and newer versions
- SLES 11 SP2 and newer versions
- ESXi 5.1 and newer versions

- The application management tools, including the OneCommand Manager application must support ARI.
- ARI must be enabled in the firmware using the OneCommand Manager application.

If these conditions are not met, you may be able to configure more than eight functions, but only up to eight functions will be running and discovered after a reboot.

Viewing the Configuration

To view the current UMC configuration:

1. On the Controller Configuration screen (Figure 11-15 on page 150), select **View Configuration** and press **<Enter>**. The View Configuration screen (Figure 11-16 on page 151) is displayed.

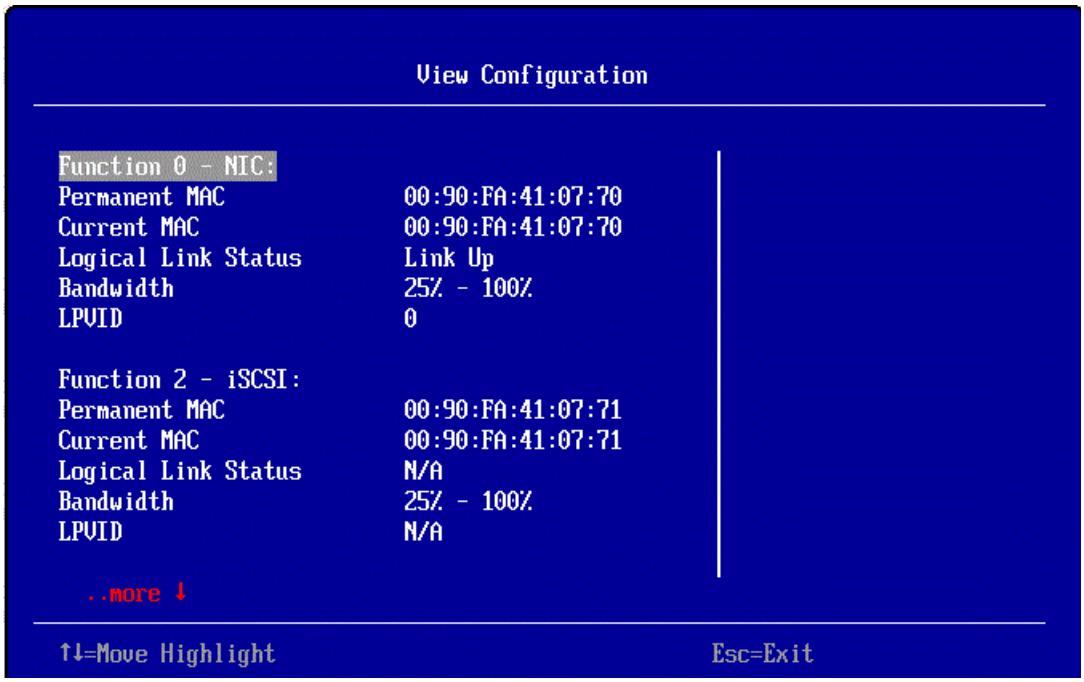

Figure 11-16 UMC Configuration for Function 0 Screen

From the View Configuration screen, you can view information for that specific function, including the permanent and current MAC addresses, the logical link status, the minimum and maximum bandwidth settings, and LPVID of all of the NIC functions.

Note: Logical Link Status and LPVID for storage functions (iSCSI and FCoE) are displayed as "N/A".

2. When you are finished viewing the configurations, press **<Esc>** to return to the Controller Configuration screen.

Configuring Minimum and Maximum Bandwidth

To configure bandwidth:

1. On the Controller Configuration screen (Figure 11-15 on page 150), select **Configure Bandwidth** and press **<Enter>**. The Configure Bandwidth screen (Figure 11-17 on page 152) is displayed.

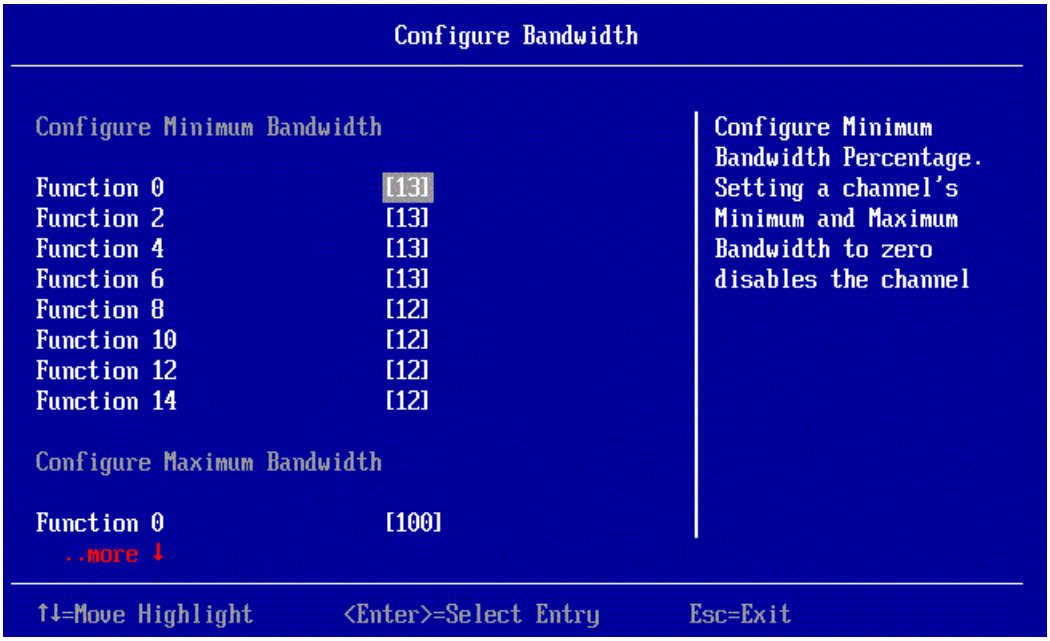

Figure 11-17 Configure Bandwidth Screen

2. Select a specific function under Configure Minimum Bandwidth or Configure Maximum Bandwidth and press **<Enter>**.
   - The Minimum Bandwidth value is the least amount of bandwidth that the function can provide. It is represented as a percentage. The Minimum Bandwidth value must be less than or equal to the Maximum Bandwidth value. The total of the Minimum Bandwidth values for all enabled functions on that port must be equal to 100.

     Note: A Minimum Bandwidth value of 0 is a valid value. If all of the partitions' Minimum Bandwidth values are zero, the bandwidth is distributed equally among the current active partitions. If a specific partition's Minimum Bandwidth and Maximum Bandwidth values are 0, that partition's logical link will be brought down.

   - The Maximum Bandwidth value is the greatest amount of bandwidth that the function can provide. It is represented as a percentage.
3. Enter the value for the specified function and press **<Enter>**.

   Note: To disable a function, set the Minimum Bandwidth and Maximum Bandwidth values to 0.

4. When you are finished configuring bandwidths, press **<Esc>** to return to the Controller Configuration screen.

Configuring the LPVID

The LPVID is used to enforce a VLAN ID on all traffic originating from an IP address, channel, or PCI function. If the operating system for that PCI function has set up a VLAN ID, then the operating system-configured VLAN ID takes precedence over the LPVID for transmit packets while the operating system-configured VLAN ID and LPVID-tagged packets will both be received. If the operating system has not set up any VLAN IDs, then the LPVID is used for tagging.

Notes

- LPVID and user-configured VLAN IDs from the operating system must be different.
- LPVIDs also need to be configured on the switch port.

Each LPVID must be unique and is relevant for NIC traffic only. The LPVID is not supported for storage functions. For iSCSI storage functions, you must configure a VLAN ID through iSCSISelect or through the host. For additional information, see "Configuring VLAN ID and VLAN Priority" on page 106.

To configure an LPVID:

1. On the Controller Configuration screen (Figure 11-15 on page 150), select **Configure LPVID** and press **<Enter>**. The Configure LPVID screen (Figure 11-18 on page 153) is displayed.

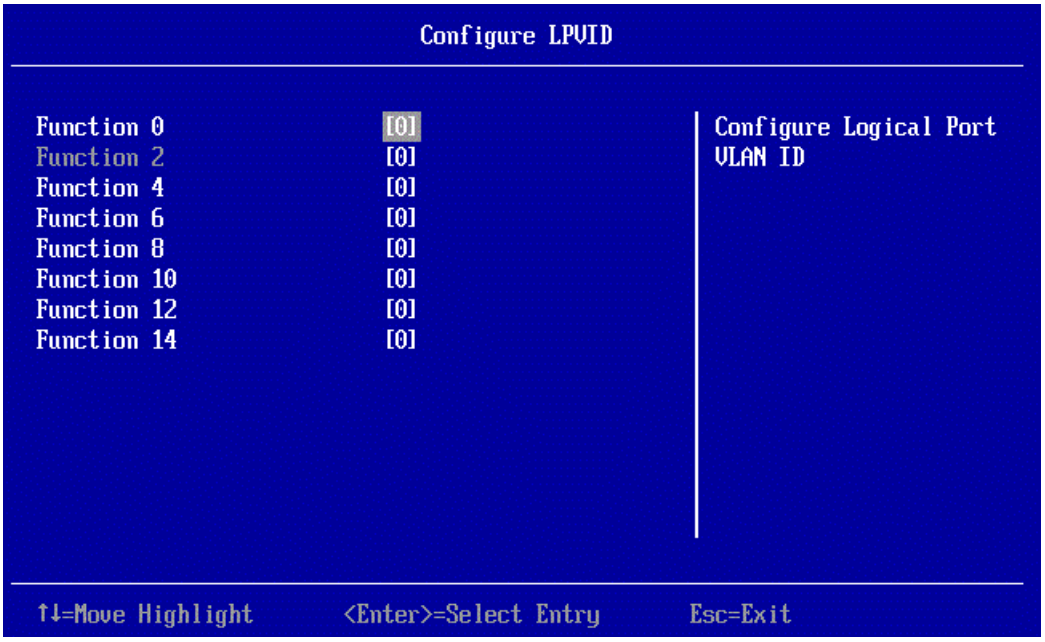

Figure 11-18 Configure LPVID Screen

2. Select the LPVID value for a specific function and press **<Enter>**.
3. Enter a value and press **<Enter>**. The LPVID range is 2-4094. A value of 0 disables the LPVID.

   Note: LPVID values 1 and 4095 are currently reserved and cannot be used or configured.

4. When you are finished configuring LPVIDs, press **<Esc>** to return to the Controller Configuration screen.

Saving the Configuration

To save the configuration changes, on the Controller Configuration screen (Figure 11-15 on page 150), select **Save Configuration** and press **<Enter>**.

Configuring Multi-Channel for IBM Adapters

Note: This section only pertains to certain Emulex OneConnect adapters that support Multi-Channel for IBM Virtual Fabric or UFP.

Multi-Channel for IBM provides the ability to configure multiple PCI functions or I/O channels for each adapter port.

Note: Setting up Multi-Channel for IBM Virtual Fabric or UFP depends on cooperation with adjacent switches.

To enable Multi-Channel for IBM support:

1. On the Emulex NIC Selection screen (Figure 11-19 on page 154), select **Multichannel Mode** and press **<Enter>**. The Multichannel Mode pop-up menu is displayed.

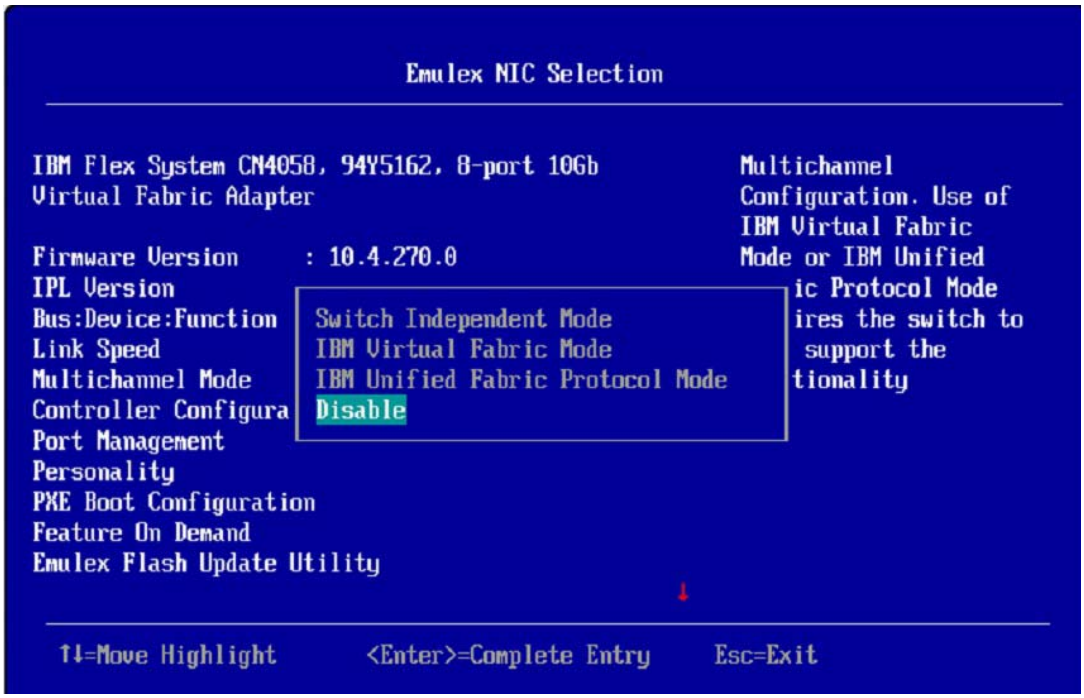

Figure 11-19 IBM Multichannel Mode Selection Pop-up Menu

2. Select one of the following settings and press **<Enter>**:
   - Switch Independent Mode
   - IBM Virtual Fabric Mode

- IBM Unified Fabric Protocol Mode
- Disabled

Note: For more information on the available Multi-Channel modes, see "Multi-Channel Modes" on page 155.

With the Multi-Channel mode selected, you can now configure Multi-Channel for IBM support. See "Multi-Channel for IBM Configuration" on page 155 for more information.

Multi-Channel Modes

Note: The following modes are available only on certain adapters and systems that support IBM Virtual Fabric and Unified Fabric Protocol modes.

An IBM Virtual Fabric-enabled switch provides the ability to configure an LPVID for a virtual channel or I/O channel on an adapter port. If Multi-Channel for IBM is supported on the system, you can select one of the following modes:

- IBM Virtual Fabric Mode – select this mode if a OneConnect adapter is attached to an IBM Virtual Fabric-enabled switch.
- IBM Unified Fabric Protocol Mode – select this mode if a OneConnect adapter is attached to an IBM UFP-enabled switch.

  Note: Some IBM switches support both UFP and IBM Virtual Fabric Mode.

- Switch Independent Mode – select this mode if you are using a switch other than an IBM Virtual Fabric or UFP-enabled switch.

Notes

- Multi-Channel for IBM functionality is supported on OneConnect adapters running in 10GbE mode only. Multi-Channel for IBM is not supported in 1GbE mode.
- An LPVID is optional for IBM Virtual Fabric Mode, but it is required for every function if using Switch Independent Mode.

Multi-Channel for IBM Configuration

Multi-Channel for IBM provides the ability to configure multiple PCI functions or I/O channels for each physical adapter port.

See the appropriate section below based on the mode you have selected.

IBM Virtual Fabric Mode Configuration

To configure Multi-Channel for IBM if the Multi-Channel mode is set to IBM Virtual Fabric Mode:

1. On the Emulex NIC Selection screen (Figure 11-19 on page 154), select **Controller Configuration** and press **<Enter>**. The Controller Configuration screen

(Figure 11-20 on page 156) is displayed.

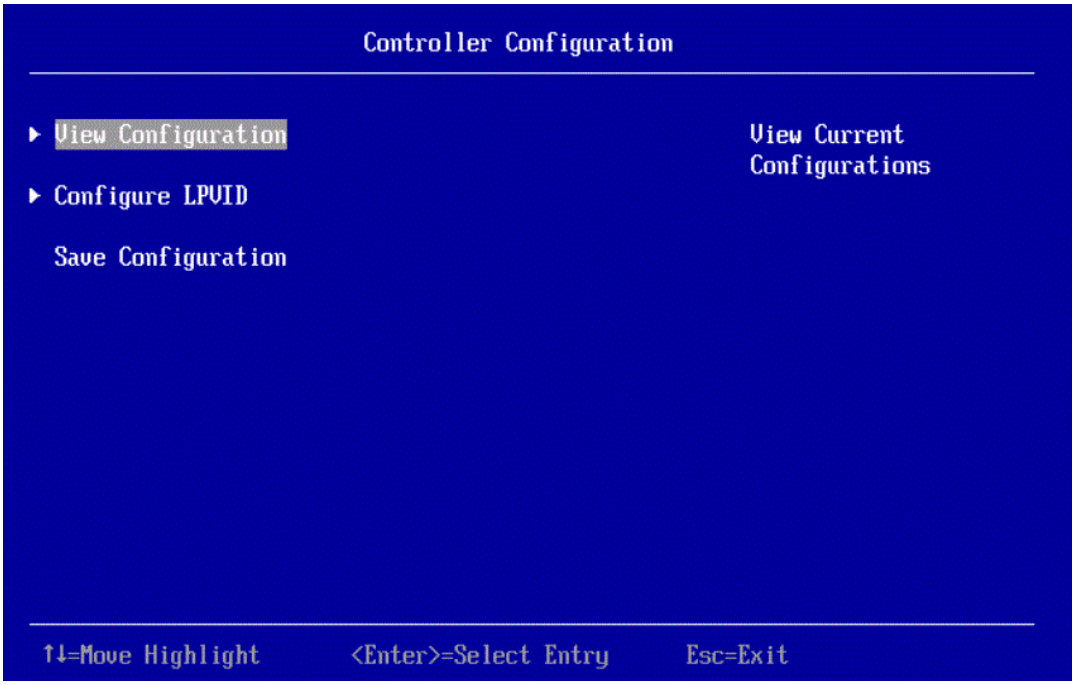

Figure 11-20 IBM Virtual Fabric Mode Controller Configuration Screen

The Controller Configuration screen enables you to perform the following tasks:

- View the current configuration of each function – see "Viewing the Configuration" on page 151.
- Configure the LPVID per function – see "Configuring the LPVID" on page 153.
- Save the current configuration – see "Saving the Configuration" on page 154.

IBM Unified Fabric Protocol Mode Configuration

To configure Multi-Channel for IBM if the Multi-Channel mode is set to IBM Unified Fabric Protocol Mode:

1. On the Emulex NIC Selection screen (Figure 11-19 on page 154), select **Controller Configuration** and press **<Enter>**. The Controller Configuration screen

(Figure 11-21 on page 157) is displayed.

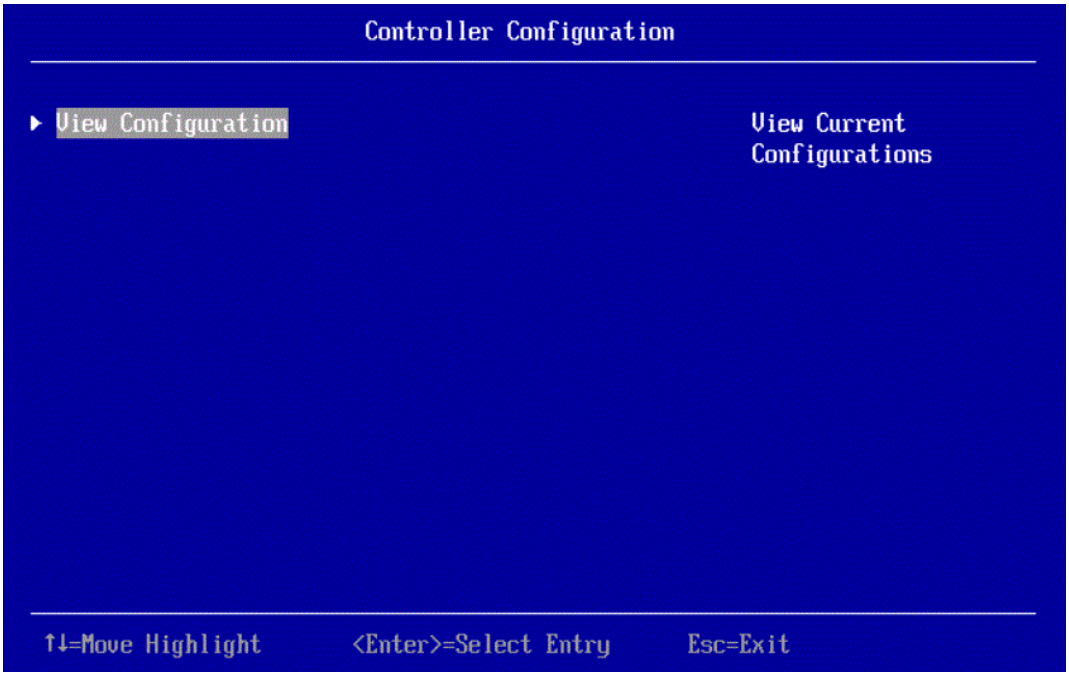

Figure 11-21 IBM UFP Controller Configuration Screen

From the Controller Configuration screen, you can perform the following tasks:

- View the current configuration of each function – see "Viewing the Configuration" on page 151 for more information.

Switch Independent Mode Configuration

To configure Multi-Channel for IBM if the Multi-Channel mode is set to Switch Independent Mode:

1. On the Emulex NIC Selection screen (Figure 11-19 on page 154), select **Controller Configuration** and press **<Enter>**. The Controller Configuration screen (Figure 11-22 on page 158) is displayed.

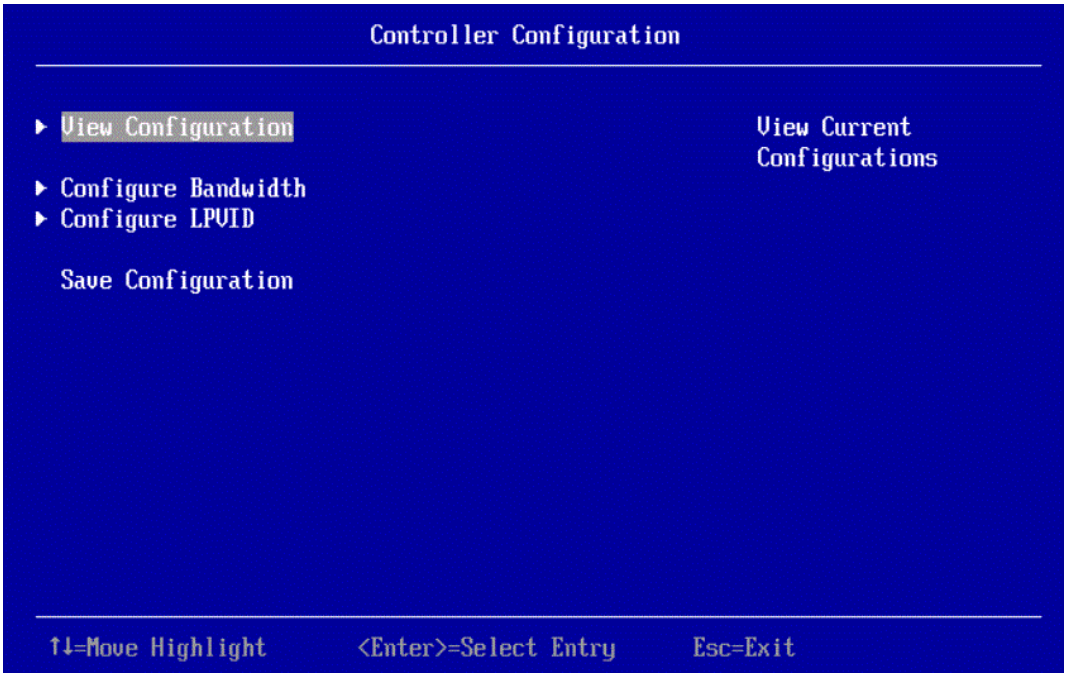

Figure 11-22 Switch Independent Mode Controller Configuration Screen

From the Controller Configuration screen, you can perform the following tasks:

- View the current configuration of each function – see "Viewing the Configuration" on page 151.
- Configure the minimum and maximum bandwidth percentage – see "Configuring Minimum and Maximum Bandwidth" on page 152.
- Configure the LPVID per function – see "Configuring the LPVID" on page 153.

  Note: An LPVID is required for every function if using Switch Independent Mode, but it is optional for IBM Virtual Fabric Mode and IBM Unified Fabric Protocol Mode.

- Save the current configuration – see "Saving the Configuration" on page 154.

Port Management

Note: The Port Management functionality is available on IBM NIC adapters only, and the configuration menu is available only on port 0.

The Port Management option is used to enable or disable the physical ports.

If port 0 is disabled, it brings down the physical link for port 0 and the power consumption of the adapter is lowered; however, the PCI functions associated with that port must remain enabled.

If any other port is disabled, all of the corresponding functions associated with that port are disabled and removed from the PCI configuration space. Disabling these ports also lowers the power consumption of the adapter.

Enabling any of the ports restores the previously removed PCI functions and restores the power consumption back to its normal state.

Note: Enabling and disabling ports is applicable in both Multi-Channel for IBM and non-Multi-Channel configurations. If Multi-Channel mode is enabled, all virtual functions associated with the disabled port will also be disabled.

To configure port management:

1. On the Emulex NIC Selection screen (Figure 11-19 on page 154), select **Port Management** and press **<Enter>**. The Port Management screen (Figure 11-23 on page 159) is displayed.

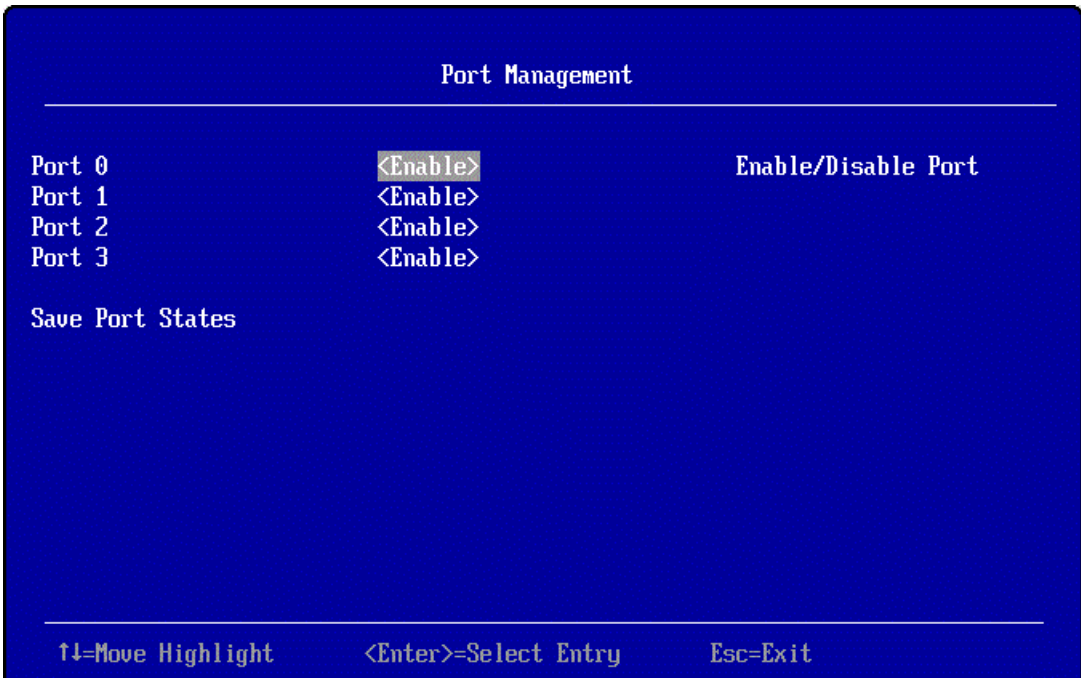

Figure 11-23 Port Management Screen

2. Select the current setting for a particular port and a pop-up menu is displayed.
3. Select **Enable** or **Disable** and press **<Enter>**.

4. When you are finished, select **Save Port States** to save the current settings.
5. Press **<Esc>** to return to the Controller Configuration screen.

Note: A reboot is required for this setting to take effect.

Feature on Demand

Note: The Feature on Demand functionality is available only on some IBM adapters.

FoD is an IBM proprietary protocol that enables storage functions on Emulex adapters. This feature requires a unique license key to be applied from IBM's Integrated Management Module. For additional information on obtaining a license key, contact your IBM representative.

The FoD Type and FUI fields are required by IBM to generate a unique license key for the specific adapter for which you have requested a license. Each adapter in the system should obtain its own license key.

To view Feature on Demand information, from the Emulex NIC Selection screen (Figure 11-19 on page 154), select **Feature On Demand** and press **<Enter>**. The Feature On Demand screen (Figure 11-24 on page 160) is displayed.

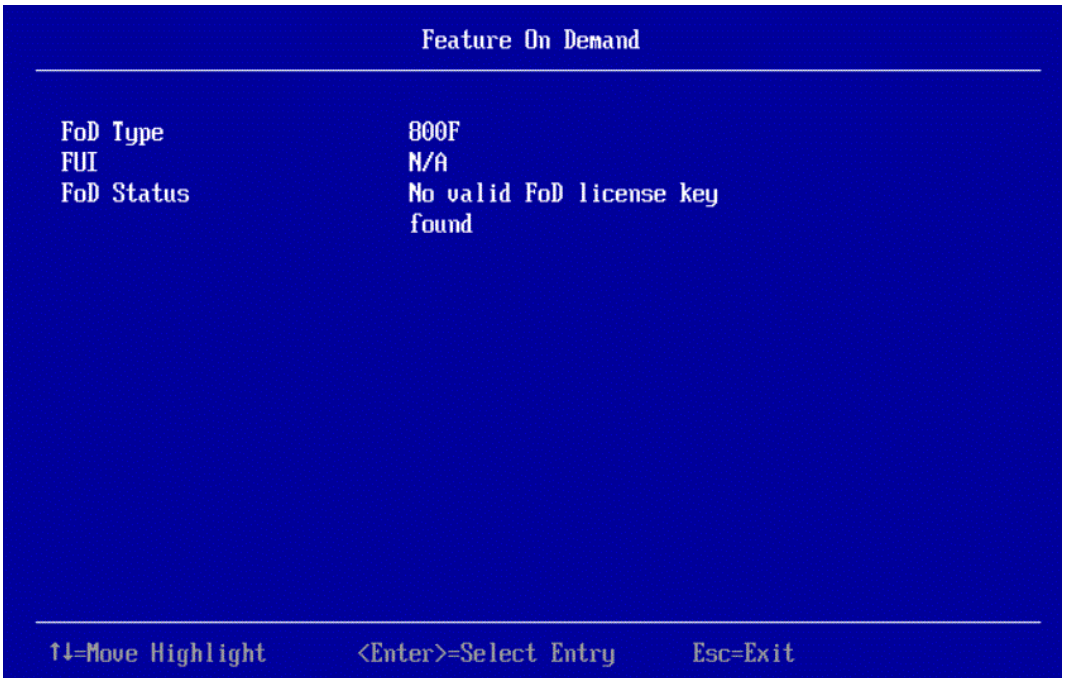

Figure 11-24 Feature On Demand Screen

From the Feature On Demand screen, you can view information on the feature type, the FoD Unique Identifier, and its current status.

FoD Type: The FoD Type field is unique for each platform. Different products have different FoD types. For example, LOM products have a different FoD type than mezzanine cards.

FUI: The FUI field is internally generated by the Emulex firmware using the FoD type and the adapter's serial number. The FUI is unique to each adapter because each card will have its own unique serial number.

FoD Status: The FoD Status field indicates whether a license key has been applied properly or not.

- If the FoD status field is set to "Enabled", it indicates that the FoD license key has been successfully applied and FoD is enabled. If FoD is enabled, you will see all of the storage personalities under the Personality menu option, including NIC, iSCSI, and FCOE.
- In all other cases, the FoD Status field indicates that a failure has occurred or that an FoD license has not been applied.

Downloading Firmware and Boot Code

A single firmware image contains the latest version of the firmware and boot code.

The firmware and UEFI NIC, iSCSI, and FCoE drivers are contained in one image file with the .UFI extension. This file must be flashed through the NIC interface exposed by HII.

To view the adapter's current firmware and boot code version, follow the steps in "Starting the Emulex NIC Configuration Utility" on page 128.

The Emulex NIC Selection screen displays the current firmware version for the selected adapter and a link to the Emulex Flash Update Utility, which you can use to download firmware and boot code.

To download firmware and boot code:

1. In an open UEFI shell, copy the firmware and boot code file into a directory on the UEFI partition media.

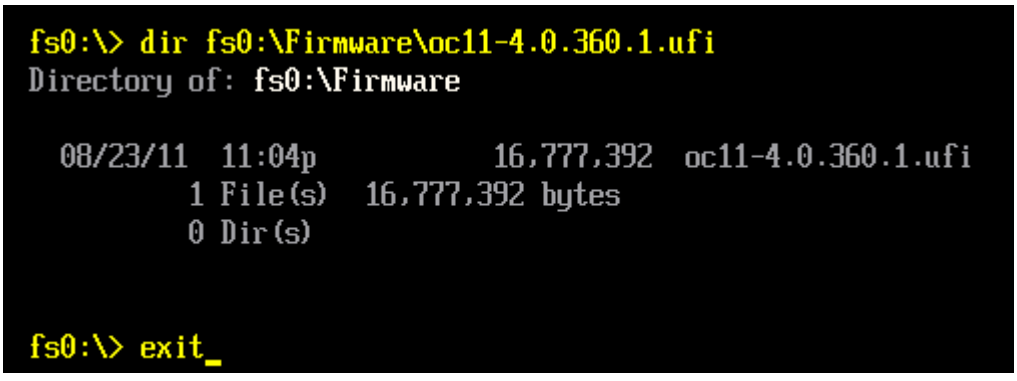

Figure 11-25 UEFI Shell with Firmware and Boot Code File

2. Exit the UEFI shell and launch the Emulex NIC configuration utility.
3. From the Network device list, select the NIC adapter you want to modify and press **<Enter>**.
4. The Emulex NIC Selection screen (Figure 11-1 on page 128) shows information for the selected adapter. Select **Emulex Flash Update Utility** and press **<Enter>**. The

Emulex Flash Update Utility screen (Figure 11-19 on page 154) is displayed. This utility displays all available media and installs the flash file on the adapter.

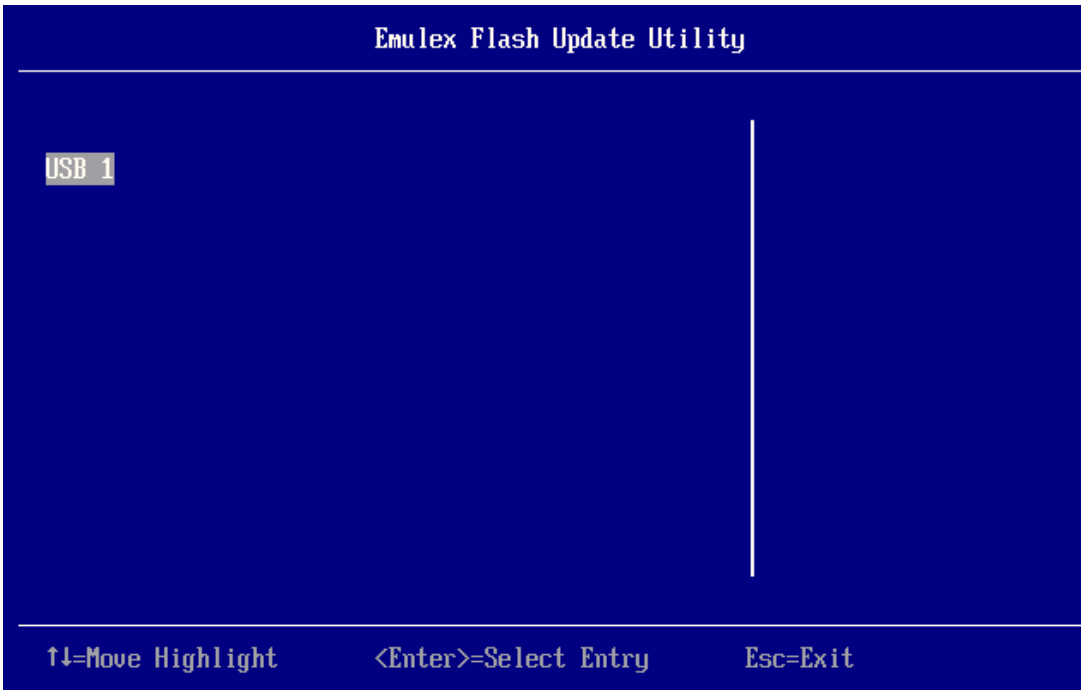

Figure 11-26 Emulex Flash Update Utility Screen

5. Press **<Enter>** to select the media containing the flash file.
6. Navigate to the directory containing the flash file and press **<Enter>** (Figure 11-27 on page 162).

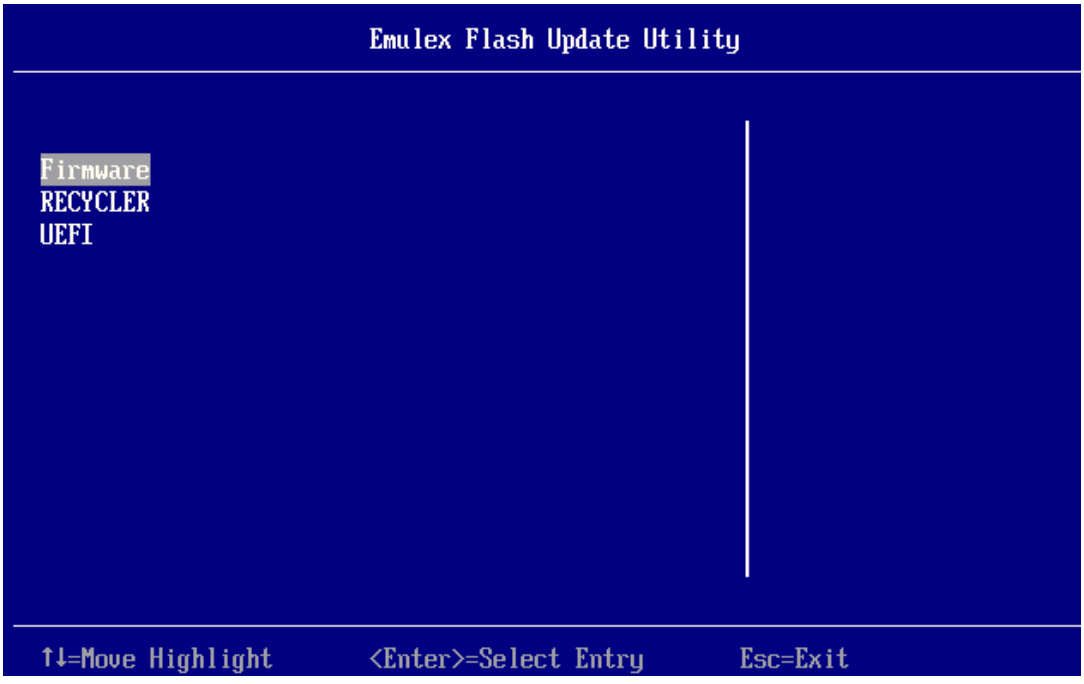

Figure 11-27 Emulex Flash Update Utility with Directory Name Screen

7. Use the arrow keys to select the flash file and press **<Enter>** to begin the update process. It takes about two minutes to complete.

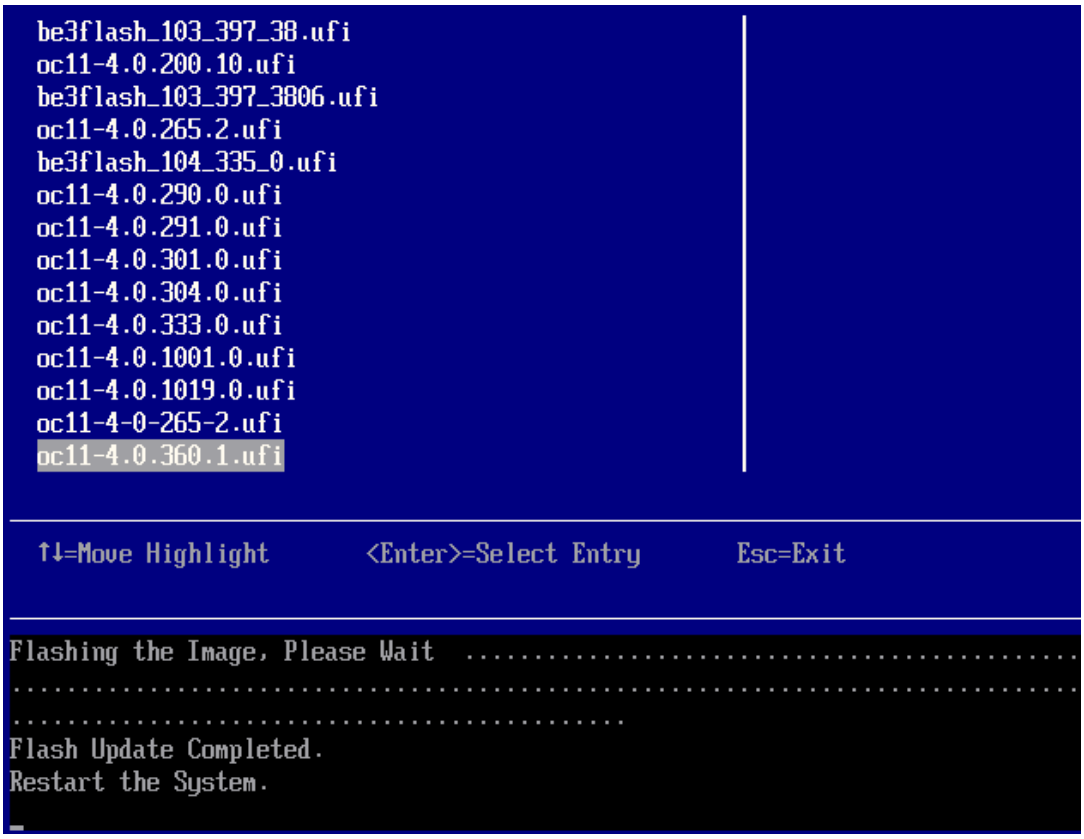

Figure 11-28 Emulex Flash Update Utility, Flash Updating Screen

Note: This firmware flash procedure only flashes the physical interface that was selected in the HII menu. All Emulex adapters must contain the same firmware version to function properly. The above procedure should be repeated for each physical interface installed in the system before proceeding to the next step.

8. Reset the system. The latest version information for the adapter is displayed in the Emulex NIC Selection screen (Figure 11-1 on page 128).

Identifying a Port

To physically identify a port on the Emulex NIC Selection screen (Figure 11-2 on page 129), select **Port Identification** and press **<Enter>**. The LEDs on the adapter start blinking indicating the selected port.

Notes

- Not all adapters have LEDs that are visible externally. If you are using an add-in card in a blade server environment, the port identification or beaconing capability does not work.

- If port identification is not supported on the system, you will receive a message stating that it is not supported.

Erasing Ports and Adapter Configurations

Notes

- If selecting this setting, all previous configuration settings are returned to their factory default settings except for the current personality selection. Emulex recommends performing this action to provide a clean environment for new configuration settings to take effect.
- The Erase Configuration option is not available on HP adapters in HP systems. Instead, use the F7 key to reset the configuration settings to their factory default settings.

To erase ports and the adapter configuration:

1. On the Emulex NIC Selection screen (Figure 11-2 on page 129), select **Erase Configuration** and press **<Enter>**.

   A warning is displayed (Figure 11-29 on page 164) asking if you want to erase the configurations for both ports of the adapter.

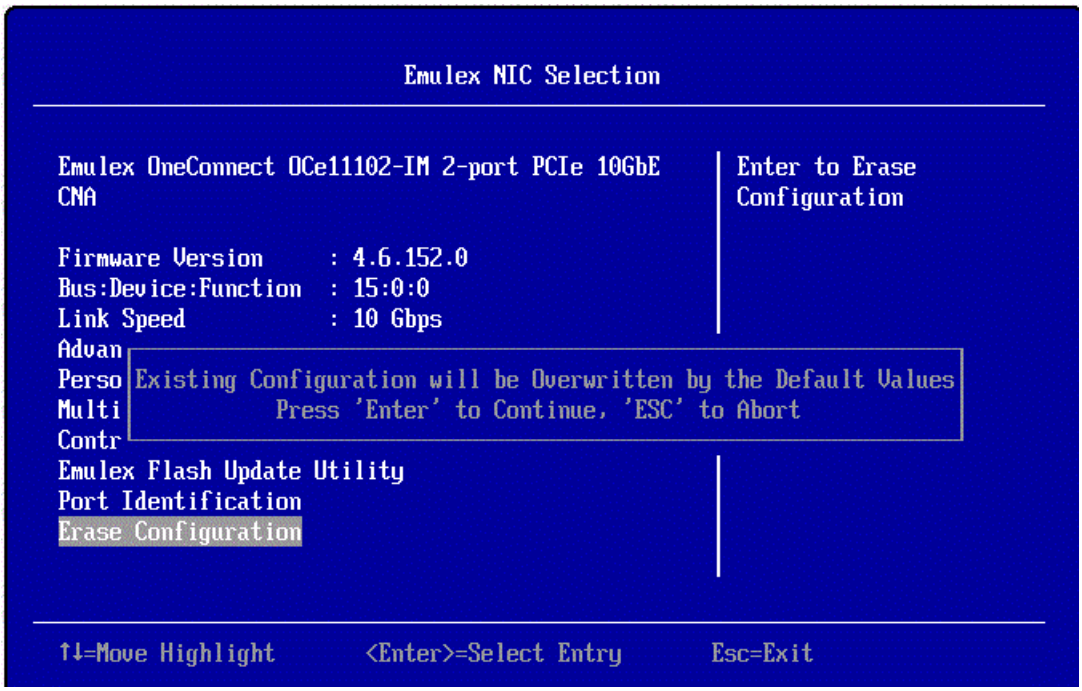

Figure 11-29 Erase Configuration Screen

2. Press **<Enter>** to delete the adapter configuration, or press **<Esc>** to abort the operation.

UEFI NIC Diagnostics

The UEFI NIC driver diagnostics protocol can be used to run diagnostic tests on each NIC function of the card. This protocol is used by a platform management utility to allow you to run driver specific diagnostics on an adapter.

EFI_DRIVER_DIAGNOSTICS_PROTOCOL

Syntax:

```
drvdiag [-c] [-l XXX] [-s] [-e] [-m] [driverhandle [devicehandle
[childhandle]]]
```

Description:

The UEFI NIC driver diagnostics protocol can be used to run diagnostic tests on each NIC function of the card. Diagnostics can be run in standard mode, extended mode, and manufacturing mode.

Parameters:

`-c`	Diagnose all child devices.
`-1 XXX`	Diagnose using the ISO 639-2 language specified by XXX.
`-s`	Run diagnostics in standard mode.
	Diagnostics in standard mode run the LED test, Link test, Get MAC test, and the DMA test (Read, Write, and Read and Write)
`-e`	Run diagnostics in extended mode.
	Diagnostics in extended mode run the ARM Timer test, the MAC Loopback test, and the Physical Loopback test.
`-m`	Run diagnostics in manufacturing mode.
	Diagnostics in manufacturing mode run the Low-level Subsystem network loopback test for the OCe11100-series, OCe14000-series, and LPe16202/OCe15100 adapters.
`driverhandle`	Handle of the driver being configured.
`devicehandle`	Handle of a device that the driverhandle is managing.
`childhandle`	Handle of a device that is a child of the devicehandle.

Examples:

The following examples show you a way of using the EFI_DRIVER_DIAGNOSTICS_PROTOCOL.

The `driver` command identifies the handle of the driver:

```
Shell> drivers


   122 Emulex 10G NIC
```

The `drvdiag` command list all the devices available for diagnostics. Each Ctrl [XXX] corresponds to a NIC function, which can be physical or virtual. The command returns handles for NIC functions on both ports.

```
Shell> driverdiag

   Drv[122] Ctrl[121]
   Drv[122] Ctrl[123]
```

To run the standard diagnostic tests on function 0:

```
Shell> drvdiag -s 122 121
```

To run the standard diagnostic tests on all NIC functions:

```
Shell> drvdiag -s 122
```

12. Configuring UEFI for iSCSI

Note: For systems with multiple adapters, the UEFI system firmware or boot code uses the highest version driver installed on any of the adapters. Adapters with older versions of EFIBoot are managed by the more recent version, but only as long as the adapter with the most recent version is in the system. The latest firmware and boot code must be installed on each adapter in the system to ensure that each adapter runs the latest firmware and boot code.

UEFIBoot supports:

- The following UEFI protocols:
  - Configuration Access protocol
  - Component Name2 protocol
- Selectable SCSI device path through the driver configuration protocol
- Up to 96 adapters in a system
- Up to 256 targets are selectable through the driver configuration protocol.
- Up to 256 LUNs are supported.
- Multi-utility – Setup is supported

This version of UEFIBoot is loaded from flash into system memory.

If UEFIBoot is loaded in a UEFI Shell, type "`drivers`" and press **<Enter>** to see if the driver is loaded.

Note: If you are using a Dell adapter, see appendix F., "Dell UEFI," on page 268 for information on using the Dell UEFI utility.

Navigating the Emulex iSCSI Configuration Utility

The Emulex iSCSI configuration utility has menus and configuration screens. Use the following methods to navigate them:

- Press the up and down arrows on the keyboard to navigate menu options or configuration fields. If multiple adapters are listed, use the up and down arrows to scroll to the additional adapters.
- Press the **<+>**, **<->**, or **<Enter>** keys to change numeric values.
- Press **<Enter>** to select an option.
- Press **<Esc>** to exit the current screen and show the previous screen.

Note: HP adapters in HP systems use the F10 key to save the current configuration settings.

Starting the Emulex iSCSI Configuration Utility

Depending on the vendor UEFI configuration, the Emulex iSCSI configuration utility may appear under different setup menus in the vendor system firmware or BIOS (such as **Storage**).

To start the Emulex iSCSI configuration utility:

1. Select the **Emulex iSCSI Utility** for a particular function (Figure 12-1 on page 168) and press **<Enter>**.

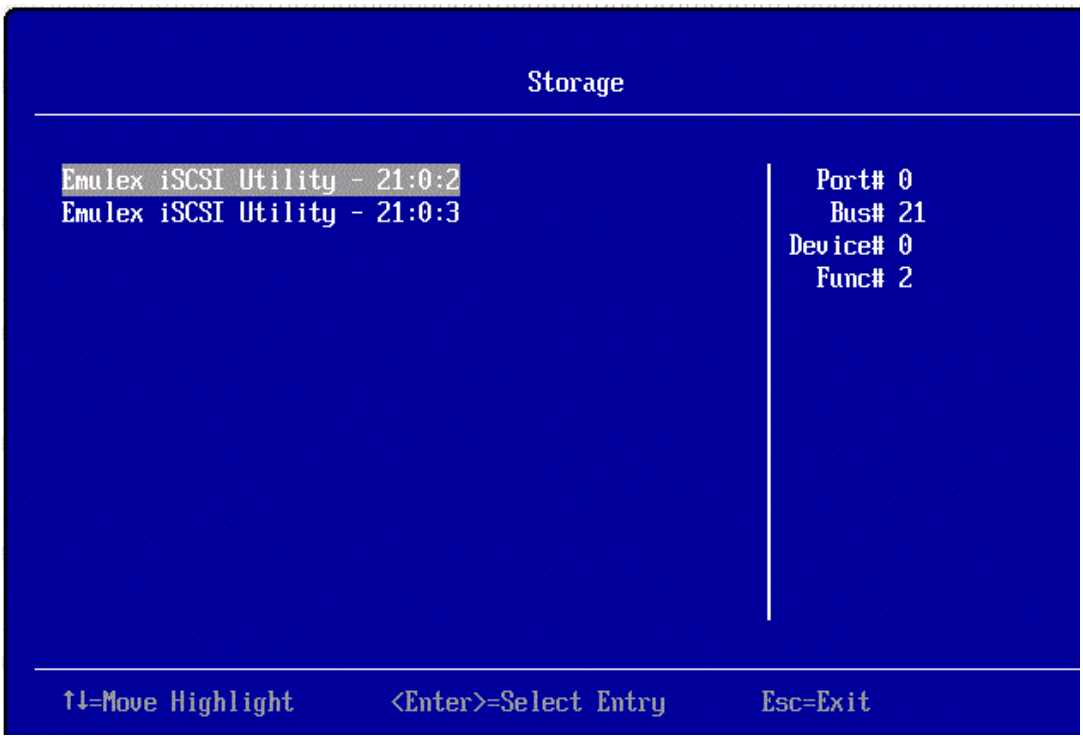

Figure 12-1 Storage Screen

The Controller Configuration Menu screen (Figure 12-2 on page 169) is displayed.

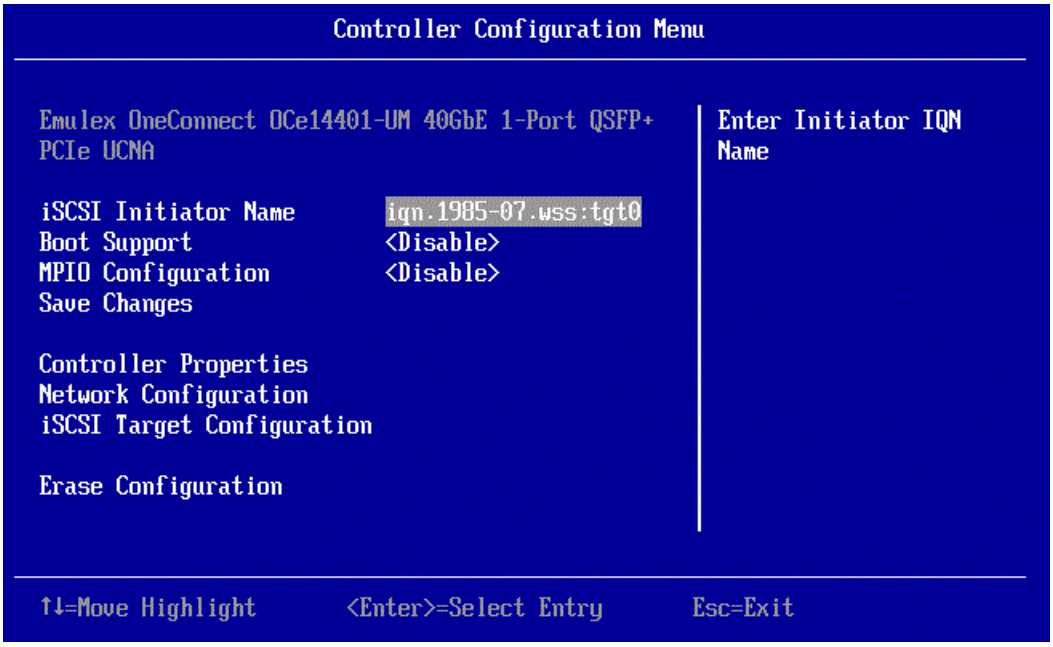

Figure 12-2 Controller Configuration Menu Screen

2. Highlight **iSCSI Initiator Name** and press **<Enter>** to edit the initiator name.

   This is a global setting. The initiator name configured on one adapter is reflected on all adapters in the system.

   Note: HP systems are an exception. Each port on an HP system can be configured with a unique initiator name.

3. To save changes, select **Save Changes** and press **<Enter>**.

Configuring MPIO

MPIO support allows the initiator to log in dual sessions to the same target. In this way I/O can be sent over either TCP/IP connection to the target. If one session fails another session can continue processing I/O without interruption to the application. In iSCSI target configuration, you have the option of setting dual network paths to a single boot LUN.

Note: Although MPIO boot support allows the initiator to log into multiple sessions, the iSCSI BIOS currently limits the number of sessions to two iSCSI sessions for a single boot LUN.

You must follow these steps in this order to configure MPIO boot support for each operating system.

1. Use the Emulex iSCSI configuration utility to configure the first path to a boot target.
2. Complete normal operating system installation.

3. Install third-party MPIO software for your operating system.
4. Configure the second path to a single boot LUN through the Emulex iSCSI configuration utility.

To configure MPIO:

1. From the Controller Configuration Menu screen (Figure 12-2 on page 169), select **MPIO Configuration** and press **<Enter>**. The MPIO Configuration pop-up menu is displayed.
2. Select **Enable** or **Disable** and press **<Enter>**.
3. To save your changes, select **Save Changes** and press **<Enter>**.

Configuring Boot Support

Boot support is provided for each port or function. If boot support is enabled, you can boot from the specified function. If boot support is disabled, you will not be able to boot from the function.

To configure boot support:

1. From the Controller Configuration Menu screen (Figure 12-2 on page 169), select **Boot Support** and press **<Enter>**. The Boot Support pop-up menu is displayed.
2. Select **Enable** or **Disable** and press **<Enter>**.
3. To save your changes, select **Save Changes** and press **<Enter>**.

Viewing the Controller Properties

To view the adapter properties:

1. From the Controller Configuration Menu screen (Figure 12-2 on page 169), select **Controller Properties** and press **<Enter>**. The Controller Properties screen

(Figure 12-3 on page 171) is displayed.

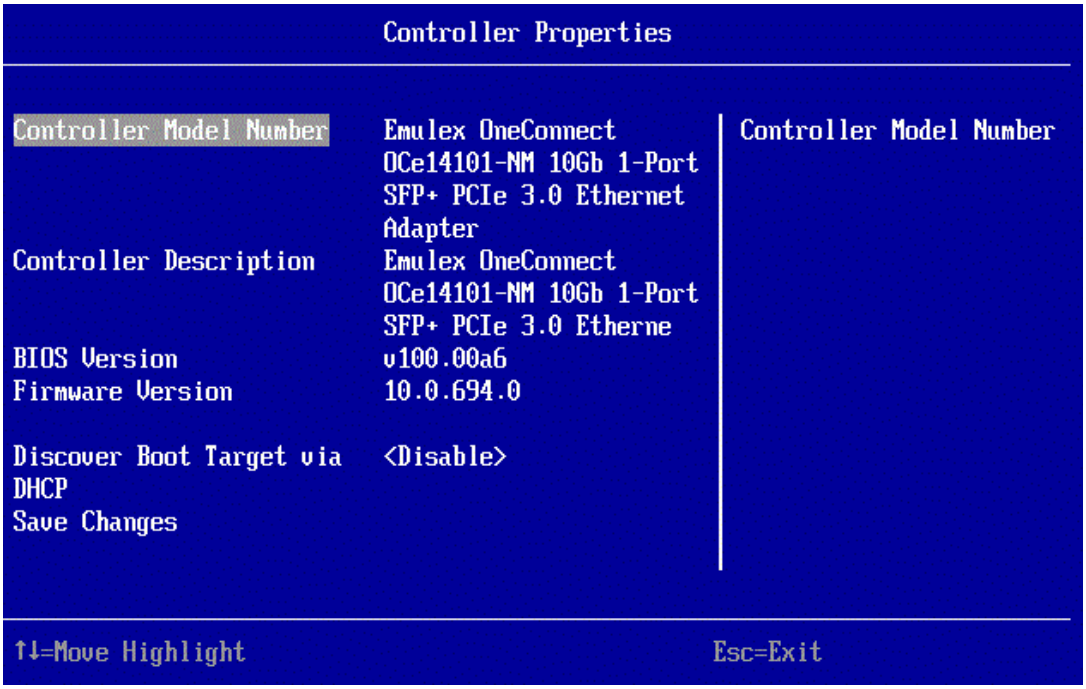

Figure 12-3 Controller Properties Screen

The Controller Properties screen displays the model number, description, BIOS version, and firmware version for the adapter. From the Controller Properties screen, you can configure the discovery of the boot target using DHCP. See “Discovering and Adding Boot Targets through DHCP” on page 179 for more information.

Configuring the Network

To configure the network:

1. From the Controller Configuration Menu screen (Figure 12-2 on page 169), select **Network Configuration** and press **<Enter>**. The Network Configuration screen (Figure 12-4 on page 172) is displayed.

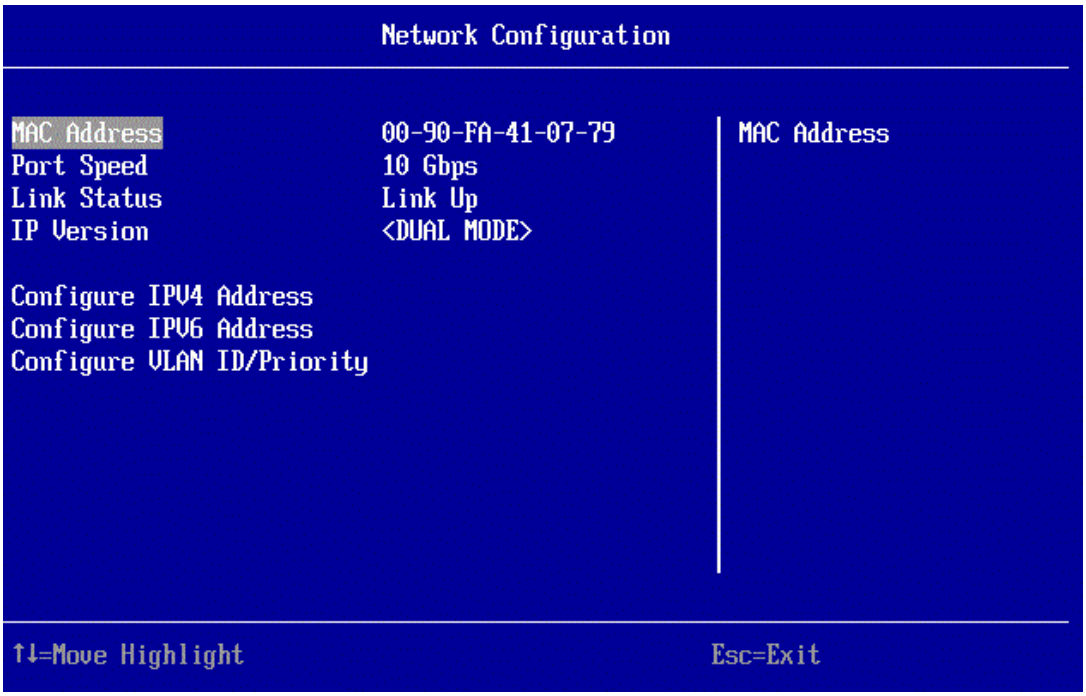

Figure 12-4 Network Configuration Screen

The Network Configuration screen displays the MAC address, port speed, and link status for the adapter. From the Network Configuration screen, you can configure the following items:

- IP version
- IPv4 address
- IPv6 address
- VLAN ID and priority

Configuring the IP Version

To configure the IP version:

1. On the Network Configuration screen (Figure 12-4 on page 172), select **IP version** and press **<Enter>**. The IP Version pop-up menu is displayed.
2. Select **IPV4**, **IPV6**, or **DUAL MODE** and press **<Enter>**.

Configuring an IPv4 Address

To configure an IPv4 address:

1. On the Network Configuration screen (Figure 12-4 on page 172), ensure the IP version is set to IPV4 or DUAL MODE.
2. Select **Configure IPV4 Address** and press **<Enter>**. The Configure IPV4 Address screen (Figure 12-5 on page 173) is displayed.

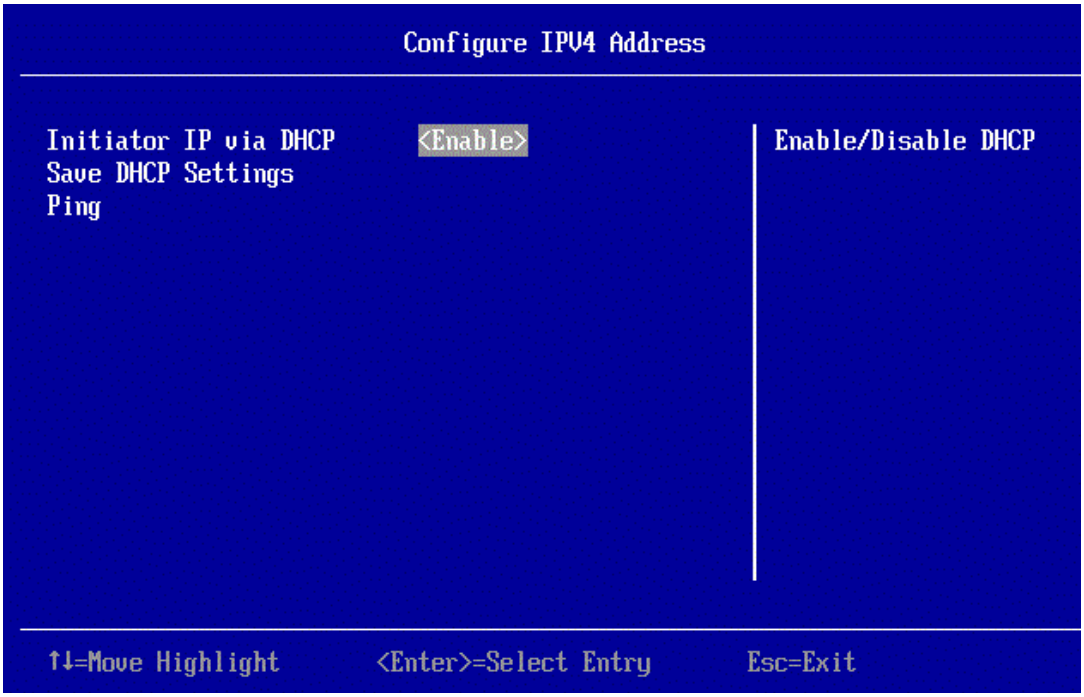

Figure 12-5 Configure IPV4 Address Screen

From the Configure IPV4 Address screen, you can do the following:

- Enable DHCP for automatic assignment of the IP address through a DHCP server. See "Automatically Assigning an IP Address through a DHCP Server" on page 173 for more information.
- Configure a static IP address (if Initiator IP via DHCP is disabled). See "Manually Assigning an IP Address" on page 174 for more information.
- Ping the iSCSI initiator. See "Pinging the iSCSI Initiator" on page 174 for more information.

Automatically Assigning an IP Address through a DHCP Server

To enable DHCP for automatic assignment of the IP address through a DHCP server:

1. On the Configure IPV4 Address screen (Figure 12-5 on page 173), select **Initiator IP via DHCP** and press **<Enter>**. The Initiator IP via DHCP pop-up menu is displayed.
2. Select **Enable** and press **<Enter>**.
3. Select **Save DHCP Settings** and press **<Enter>**.

Manually Assigning an IP Address

To manually assign an IP address:

1. On the Configure IPV4 Address screen (Figure 12-5 on page 173), ensure that the Initiator IP via DHCP is set to **<Disable>**. If you change this setting from <Enable> to <Disable>, select **Save DHCP Settings** and press **<Enter>**.
2. Select **Configure Static IP Address** and press **<Enter>**. The Configure Static IP Address screen (Figure 12-6 on page 174) is displayed.

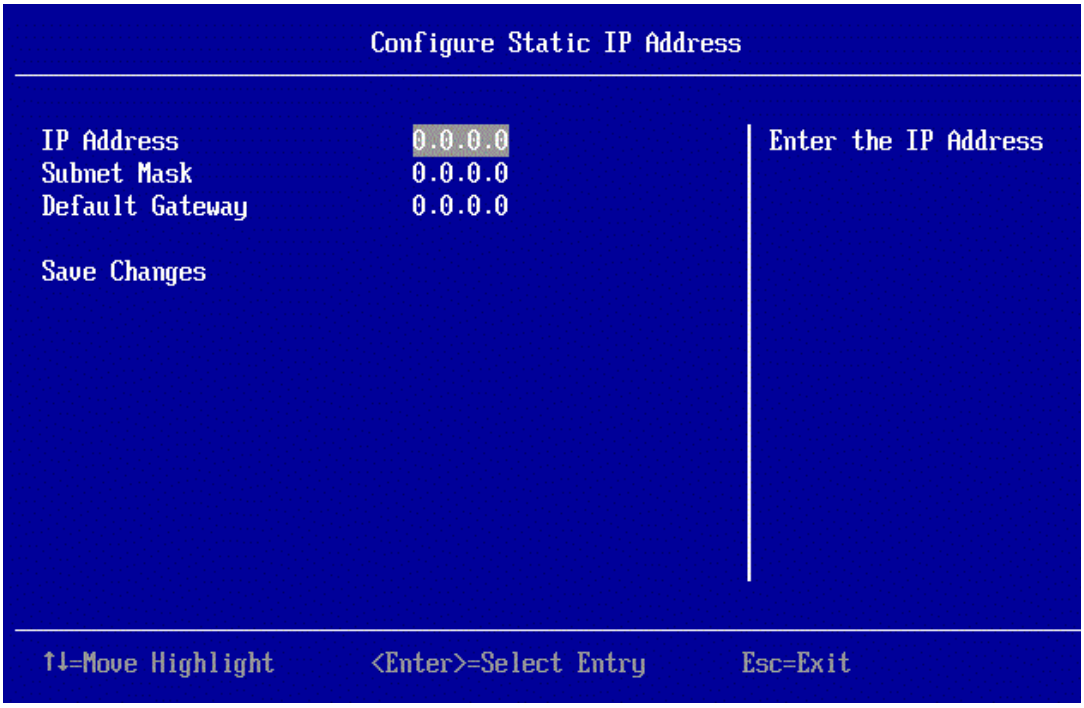

Figure 12-6 Configure Static IP Address Screen

3. Enter the IP address, subnet mask, and default gateway in the corresponding fields.
4. Select **Save Changes** and press **<Enter>**.

Pinging the iSCSI Initiator

To ping the iSCSI initiator:

1. On the Configure IPV4 Address screen (Figure 12-5 on page 173), select **Ping** and press **<Enter>**. A pop-up text box appears.
2. Enter the IP address of the iSCSI initiator in the text box and press **<Enter>.**
   - If the ping is successful, a reply message is displayed with the iSCSI initiator IP address.
   - If the ping is not successful, a failure message is displayed.

Configuring an IPv6 Address

Note: For HP adapters in HP systems, all of the following IPv6 configuration options are available from the Configure IPV6 Address screen. The instructions in the following sections still apply to HP adapters; however, use **F10** to save the configuration settings.

To configure an IPv6 address:

1. On the Network Configuration screen (Figure 12-4 on page 172), ensure the IP version is set to IPV6 or DUAL MODE.
2. Select **Configure IPV6 Address** and press **<Enter>**. The Configure IPV6 Address screen (Figure 12-7 on page 175) is displayed.

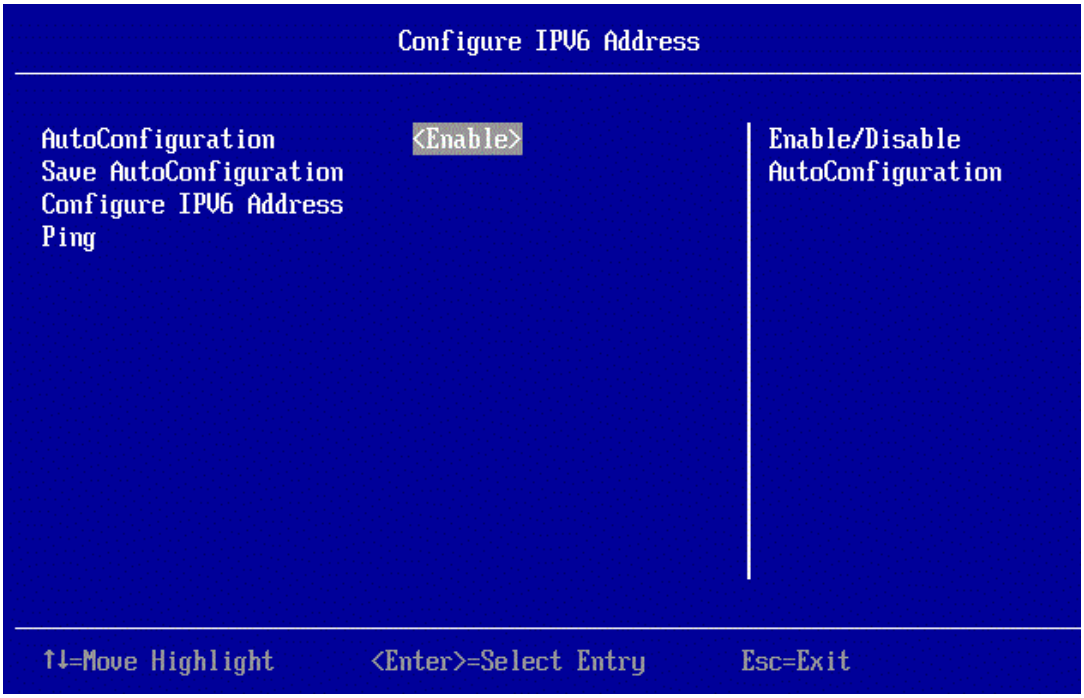

Figure 12-7 Configure IPV6 Address Screen

From the Configure IPV6 Address menu, you can do the following:

- Enable automatic configuration of the IP address. See "Automatically Configure an IP Address" on page 176 for more information.
- Configure the IPv6 address. See "Configuring the IPv6 Address" on page 176 for more information.
- Ping the iSCSI initiator. See "Pinging the iSCSI Initiator" on page 177 for more information.

Automatically Configure an IP Address

To enable automatic IP address configuration:

1. On the Configure IPV6 Address screen (Figure 12-7 on page 175), select **AutoConfiguration** and press **<Enter>**. The AutoConfiguration pop-up menu is displayed.
2. Select **Enable** and press **<Enter>**.
3. Select **Save AutoConfiguration** and press **<Enter>**.

Configuring the IPv6 Address

To configure the IPv6 address:

1. On the Configure IPV6 Address screen (Figure 12-7 on page 175), select **Configure IPV6 Address** and press **<Enter>**. The Configure IPV6 Address screen (Figure 12-8 on page 176) is displayed.

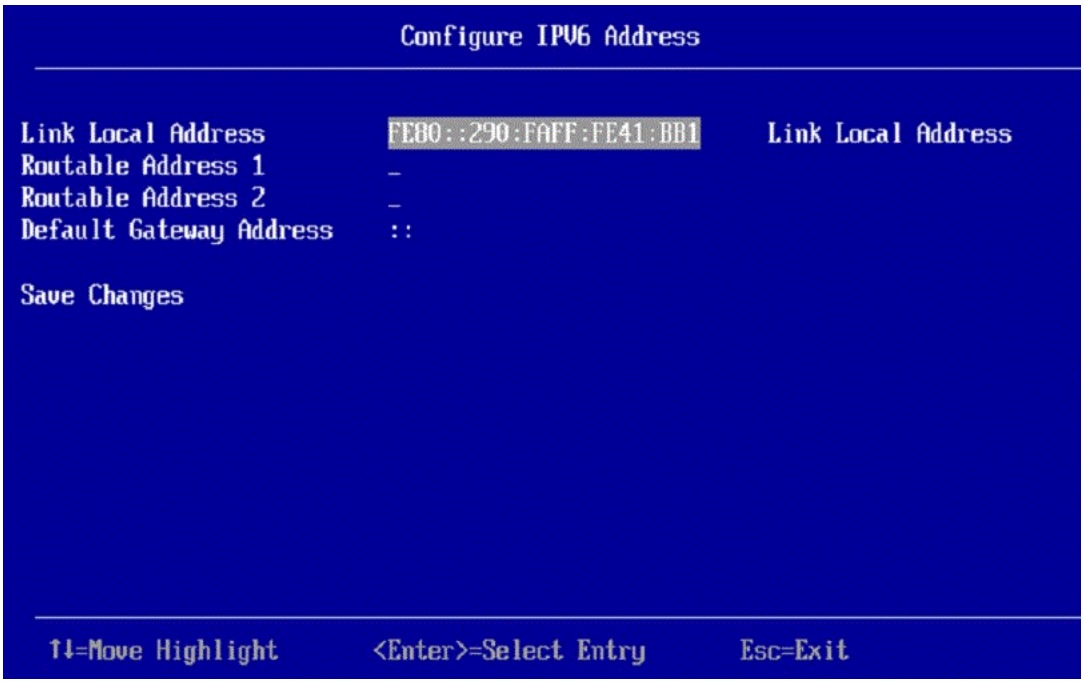

Figure 12-8 Configure IPV6 Address Settings Screen

2. Enter the following information in the corresponding fields:
   - Link Local Address – The unique address assigned to the port which is available for use inside the local network but not outside of the local network.
   - Routable Address 1 – A routable address assigned to the iSCSI port.
   - Routable Address 2 – A second routable address assigned to the iSCSI port.
   - Default Gateway – A gateway is a router on a computer network that serves as an access point to another network and that an initiator uses by default.
3. Select **Save Changes** and press **<Enter>**.
4. Press **<Esc>** to exit the menu.

Pinging the iSCSI Initiator

To ping the iSCSI initiator:

1. On the Configure IPV6 Address screen (Figure 12-7 on page 175), select **Ping** and press **<Enter>**. A pop-up text box appears.
2. Enter the IP address of the iSCSI initiator in the text box and press **<Enter>.**
   - If the ping is successful, a reply message is displayed with the iSCSI initiator IP address.
   - If the ping is not successful, a failure message is displayed.

Configuring VLAN ID and Priority

A VLAN is a way of partitioning the network. If the LAN is made up of all devices within a broadcast domain, a VLAN is a broadcast domain made up of switches. You first create a VLAN and then assign ports to a VLAN. All ports in a single VLAN are in a single broadcast domain.

You do not have to configure VLANs unless the network is already using them. Some reasons why VLANs are used include:

- A LAN increases in size with numerous devices.
- A LAN has extensive broadcast traffic on it.
- Groups of users on a LAN need more security.

A VLAN ID, like an IP address or initiator name, is assigned a value to uniquely identify it on a network. A VLAN priority is set to determine what packet gets priority order within a VLAN.

To configure a VLAN ID and priority:

1. On the Network Configuration screen (Figure 12-4 on page 172), select **Configure VLAN ID/Priority** and press **<Enter>**. The Configure VLAN ID/Priority screen (Figure 12-9 on page 178) is displayed.

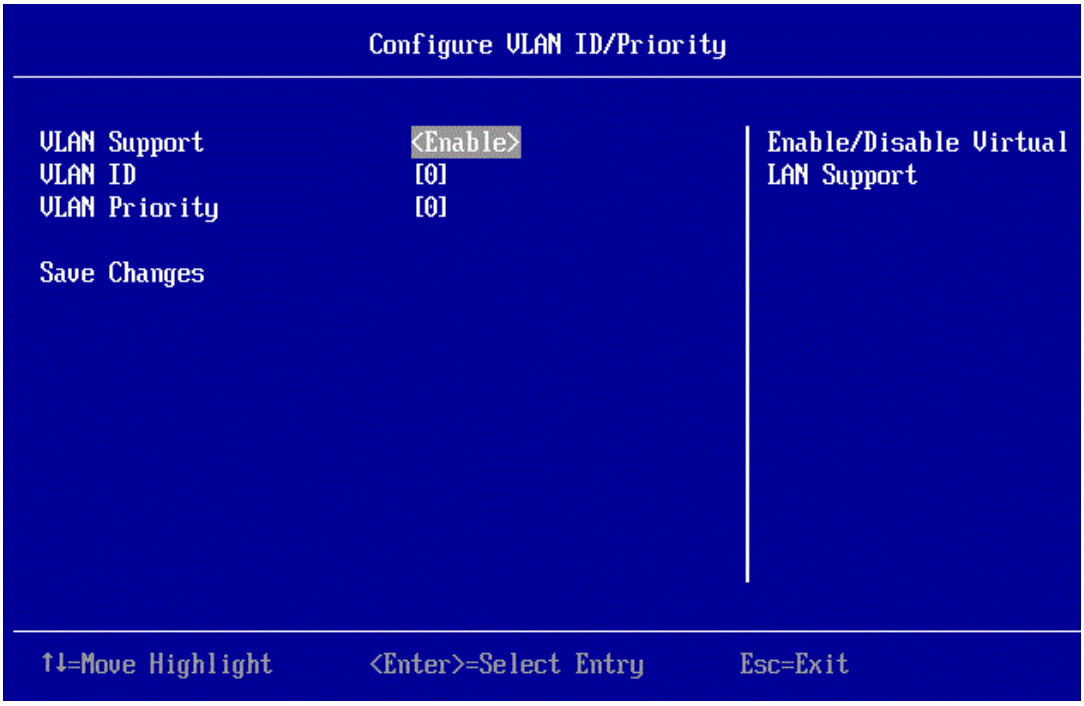

Figure 12-9 Configure VLAN/ID Priority Screen

2. To enable VLAN support:
   a. Select **VLAN Support** and press **<Enter>**. The VLAN Support pop-up menu is displayed.
   b. Select **Enable** and press **<Enter>**.
3. To assign a VLAN ID number:
   a. Select **VLAN ID** and press **<Enter>**. This is a unique value you assign to each VLAN on a single device. Valid values range from 2 to 4094.
   b. Enter a VLAN ID value and press **<Enter>**.
4. To set a VLAN priority, if necessary:
   a. Select **VLAN PRIORITY** and press **<Enter>**. This unique value assigns a priority to outbound packets containing a specified VLAN ID. Valid values range from 0 to 7, with 0 the highest priority level.
   b. Enter a VLAN priority value and press **<Enter>**.
5. Select **Save Changes** and press **<Enter>**.
6. Press **<Esc>** to return to the Network Configuration screen.

Updating Firmware

To update firmware, you must use the NIC firmware update utility, which revises the iSCSI function with a single firmware download image. For more information on downloading firmware, see “Downloading Firmware and Boot Code” on page 161.

Adding and Configuring Targets

After the initiator has been configured, you must make an iSCSI target available to the initiator host. Targets can be discovered automatically using DHCP discover, SendTargets discovery, or you can manually configure targets.

Before you begin the login session, gather the following information:

- iSCSI target name (manual configuration only) – The target name that you are adding. The iSCSI target name is not required if you are using DHCP or SendTargets discovery. It is required for manually configured targets only. This name should be known to you based on how you configured the iSCSI target.
- iSCSI target IP address – The IP address of the target into which you are logging.
- TCP port number – The TCP port number of the target portal. Typically this is 3260, which is the well-known port number defined for use by iSCSI.

Discovering and Adding Boot Targets through DHCP

To automatically discover and add boot targets through DHCP:

1. On the Controller Properties screen (Figure 12-3 on page 171), set **Discover Boot Target via DHCP** to **<Enable>** and press **<Enter>**.
2. Select **Save Changes** and press **<Enter>**.
3. Reboot the system.
4. On the Controller Configuration Menu screen (Figure 12-2 on page 169), select **iSCSI Target Configuration** and press **<Enter>**. The iSCSI Target Configuration screen (Figure 12-10 on page 180) shows the discovered targets.

   Note: For more information on configuring a DHCP boot target, see "Discovering Targets through DHCP for iSCSI" on page 124.

Figure 12-10 iSCSI Target Configuration Screen

Using SendTargets Discovery to Add an iSCSI Target

The iSCSI initiator uses SendTargets discovery to locate names of available targets. Use this method if an iSCSI node has a large number of targets.

To configure an iSCSI target using the SendTargets discovery:

1. On the Controller Properties screen (Figure 12-3 on page 171), set **Discover Boot Target via DHCP** to **<Disable>** and press **<Enter>**.
2. Select **Save Changes** and press **<Enter>**.
3. Reboot the system.
4. From the Controller Configuration Menu screen (Figure 12-2 on page 169), select **iSCSI Target Configuration** and press **<Enter>**. The iSCSI Target Configuration screen (Figure 12-10 on page 180) is displayed.
5. Select **Add Target** and press **<Enter>**. The Add/Ping iSCSI Target screen (Figure 12-12 on page 182) is displayed.
6. Leave the iSCSI Target Name blank.
7. Enter the iSCSI target IP address.
8. Change the TCP port number value, if necessary. The default number is 3260.
9. If you are connecting dual sessions to the same target portal group, enter a unique ISID Qualifier, which can be any number up to 65535. For more information on when an ISID value must be changed, see "Booting from SAN for iSCSI MPIO" on page 75.
10. Leave the Boot Target field set to "No" for now; you will return to this field later to enable the boot target.

11. Set the Header Digest to Yes if you want to enable the header digest. If the Header Digest is set to Yes, and the iSCSI initiator is set accordingly, the integrity of an iSCSI protocol data unit's header segment is protected by CRC32C checksum. The default is disabled.
12. Set the Data Digest to Yes if you want to enable the data digest. If the Data Digest is set to Yes, and the iSCSI initiator is set accordingly, the integrity of an iSCSI protocol data unit's data segment is protected by CRC32C checksum. The default is disabled.
13. Select an authentication method (optional). If you are enabling an authentication method, you are prompted to enter CHAP configuration.
14. Select **Save/Login**. A message reminds you that you have left the iSCSI Target name blank and that the SendTargets mechanism will be used. If you want to continue, press **<Y>**.
15. After you send the SendTargets request, the firmware attempts to log into the target. If it is successful, the Targets Discovered Via SendTargets screen (Figure 12-11 on page 181) displays a list of targets.

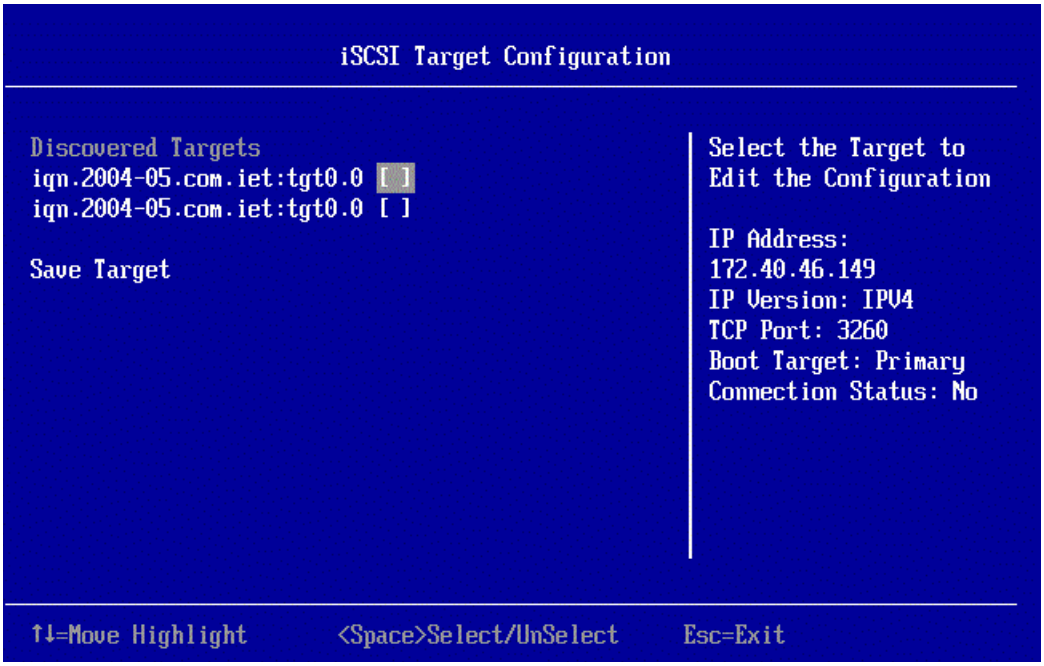

Figure 12-11 Discovered Targets Screen

16. Select the targets you want to add from the list and press the space bar.
17. Add these targets to the list of iSCSI targets available for the initiator to log into by selecting **Save Target** and press **<Enter>**. If you enabled CHAP Authentication, you are prompted to enter CHAP configuration for each target, one at a time.
18. From the Controller Configuration Menu screen (Figure 12-2 on page 169), select **iSCSI Target Configuration** and press **<Enter>** to view the added target information.

Note: If you set the Boot Target option in step 5 before adding the target, the Boot Target is displayed as No. To enable Boot Target, To enable Boot Target, continue with step 19. Otherwise, you have completed the procedure.

19. To enable Boot Target or make any other changes to the targets, select the target and press **<Enter>**. The Edit/Ping iSCSI Target screen (Figure 12-13 on page 183) is displayed. From this screen, you can edit the target.

Manually Adding, Discovering, and Managing Boot Targets

To manually add and discover boot targets:

1. On the Controller Properties screen (Figure 12-3 on page 171), set **Discover Boot Target via DHCP** to **<Disable>** and press **<Enter>**.
2. Select **Save Changes** and press **<Enter>**.
3. Reboot the system.
4. On the iSCSI Target Configuration screen (Figure 12-10 on page 180), select **Add Targets** and press **<Enter>**. The Add/Ping iSCSI Target screen (Figure 12-12 on page 182) is displayed.

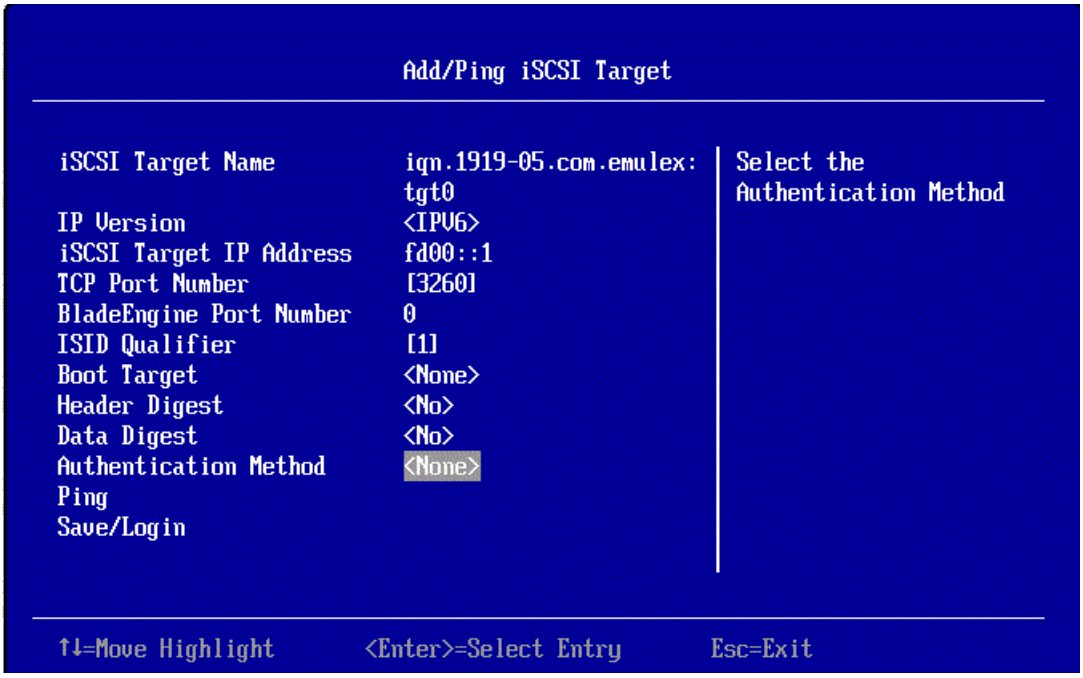

Figure 12-12 Add/Ping iSCSI Target Screen

5. Enter the target IP address and TCP port number (the default target port number is 3260).
6. If you are connecting dual sessions to the same target portal group, enter a unique ISID Qualifier, which can be any number up to 65535. For more information on when an ISID value must be changed, see "Booting from SAN for iSCSI MPIO" on page 75.
7. Leave the Boot Target field set to "No" for now; you will return to this field later to enable the boot target.

8. Set the Header Digest to Yes if you want to enable the header digest. If the Header Digest is set to Yes, and the iSCSI initiator is set accordingly, the integrity of an iSCSI protocol data unit's header segment is protected by CRC32C checksum. The default is disabled.
9. Set the Data Digest to Yes if you want to enable the data digest. If the Data Digest is set to Yes, and the iSCSI initiator is set accordingly, the integrity of an iSCSI protocol data unit's data segment is protected by CRC32C checksum. The default is disabled.
10. Select an authentication method (optional). If you are enabling an Authentication method, you are prompted to enter CHAP configuration. For more information about the authentication method, see "Selecting an Authentication Method" on page 184.
11. Select **Save/Login** and press **<Enter>** to discover targets.

Setting a Boot Target

The discovered target must be set as a boot target to enable iSCSI boot.

To set a boot target:

1. On the iSCSI Target Configuration screen (Figure 12-10 on page 180), select the target name and press **<Enter>**. The Edit/Ping Target screen (Figure 12-13 on page 183) is displayed.

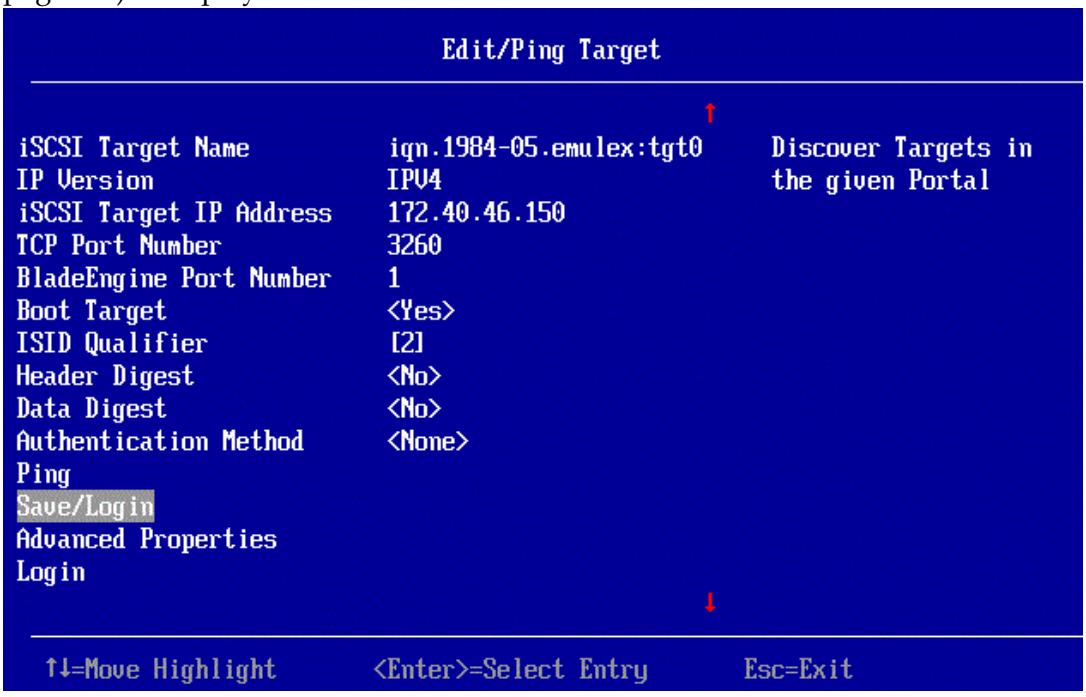

Figure 12-13 Edit/Ping Target Screen

2. Select the **Boot Target** option and press **<Enter>**. The Boot Target pop-up menu is displayed.
3. Select **Primary** or **Secondary** and press **<Enter>**.
4. Select **Save/Login** and press **<Enter>**.

Selecting an Authentication Method

The Emulex iSCSI configuration utility uses CHAP to authenticate initiators and targets for added network security. By using a challenge and response security mechanism, CHAP periodically verifies the initiator's identity. This authentication method depends on a secret key known to the initiator and the target only. Although the authentication can be one-way, you can negotiate CHAP in both directions with the help of the same secret set for mutual authentication. You must make sure however, that what you configure on the target side matches the initiator side. The Emulex iSCSI configuration utility supports both one-way and mutual authentication.

To configure the CHAP authentication method:

1. On the iSCSI Target Configuration screen (Figure 12-10 on page 180), select the target name and press **<Enter>**. The Edit/Ping Target screen (Figure 12-13 on page 183) is displayed.
2. Select the **Authentication Method** option and press **<Enter>**. The Authentication Method pop-up menu is displayed.
3. Select **None**, **One-way CHAP**, or **Mutual CHAP** and press **<Enter>**.
   - One-way CHAP – With one-way CHAP authentication, the target authenticates the initiator. Use one-way CHAP authentication for a one-way challenge and response security method – you must configure the username and password (secret), which is authenticated by the target.
   - Mutual CHAP – With mutual CHAP authentication, the target authenticates the initiator and the initiator authenticates the target. Use mutual CHAP authentication for a two-way challenge and response security method – you must configure different CHAP and mutual CHAP usernames and passwords.

   Note: When you configure the CHAP parameters, verify that those parameters match the parameters on the storage side.
4. Select **Save/Login** and press **<Enter>**.

Pinging a Target

Note: If you want to verify that you can connect to a target before you log in, you must ping the target before you configure the target on the Edit/Ping Target screen.

To ping a target:

1. On the iSCSI Target Configuration screen (Figure 12-10 on page 180), select the target name and press **<Enter>**. The Edit/Ping Target screen (Figure 12-13 on page 183) is displayed.
2. Select **Ping** and press **<Enter>**. If the ping is successful, a reply message (Figure 12-14 on page 185) is displayed.

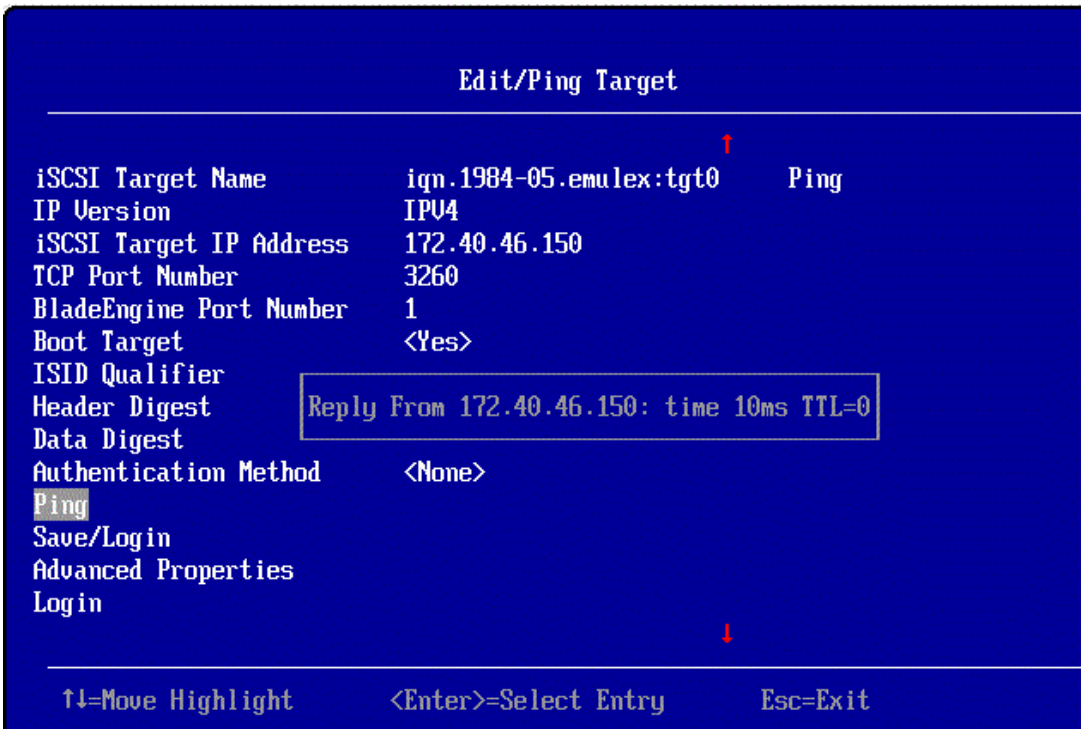

Figure 12-14 Successful Target Ping

If the ping is not successful, a failure message is displayed. A ping can be unsuccessful for several reasons; for more information, see "Troubleshooting for the iSCSI Protocol" on page 218.

Viewing Advanced Properties

To view advanced properties:

1. On the Edit/Ping Target screen (Figure 12-13 on page 183), select **Advanced Properties** and press **<Enter>**. The Advanced iSCSI Target Information screen (Figure 12-15 on page 186) is displayed.

   Note: You may need to select **..more** to show additional configuration options.

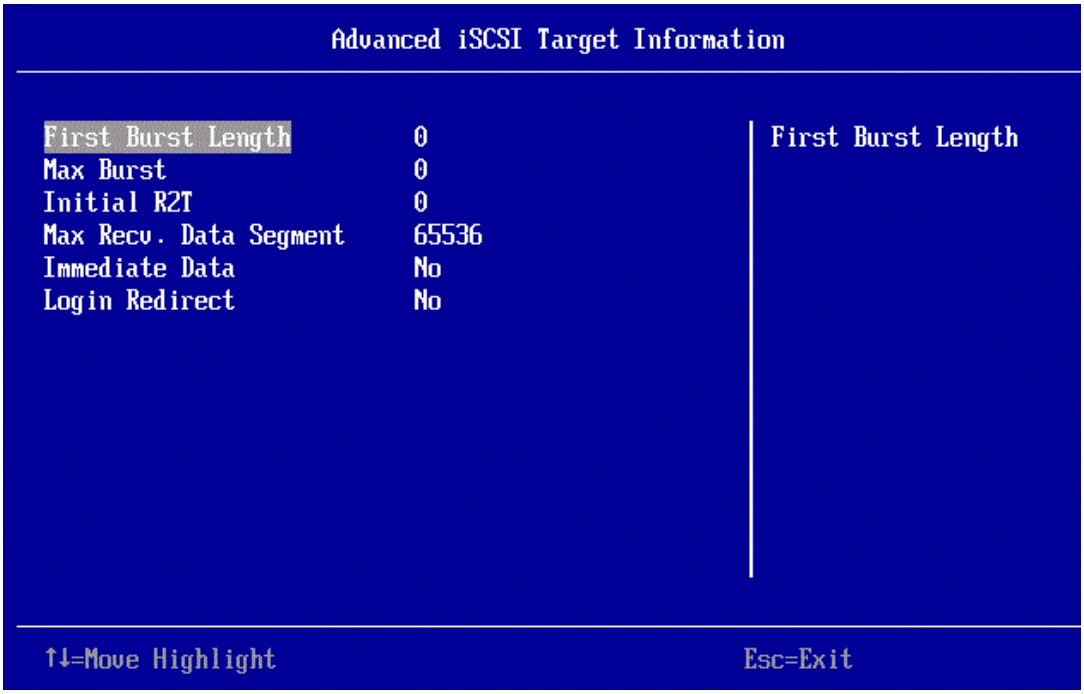

Figure 12-15 Advanced iSCSI Target Information Screen

Logging Into or Out of a Target

To log into or out of a target:

1. On the Edit/Ping Target screen (Figure 12-13 on page 183), select **Login** or **Logout** to explicitly log into or log out of a target, and then press **<Enter>**.

   Note: You may need to select **..more** to show additional configuration options.

Deleting a Target

Note: A target can be deleted only if it is not a boot target.

If a target is set as a boot target:

1. On the Edit/Ping Target screen (Figure 12-13 on page 183), select **Boot Target** and press **<Enter>**. The Boot Target pop-up menu is displayed.
2. Select **No** and press **<Enter>**.
3. Select **Save/Login** and press **<Enter>**.

To delete the target:

1. On the Edit/Ping Target screen (Figure 12-13 on page 183), select **..more** to show additional configuration options.
2. Select **Delete Target** and press **<Enter>**.

Configuring LUNs

A LUN represents an individually addressable logical device that is part of a target. An initiator negotiates with a target to establish connectivity to a LUN.

To configure a LUN:

1. On the Edit/Ping Target screen (Figure 12-13 on page 183), select **LUN Configuration** and press **<Enter>**. The LUN Configuration screen (Figure 12-16 on page 187) is displayed.

   Note: You may need to select **..more** to show additional configuration options.

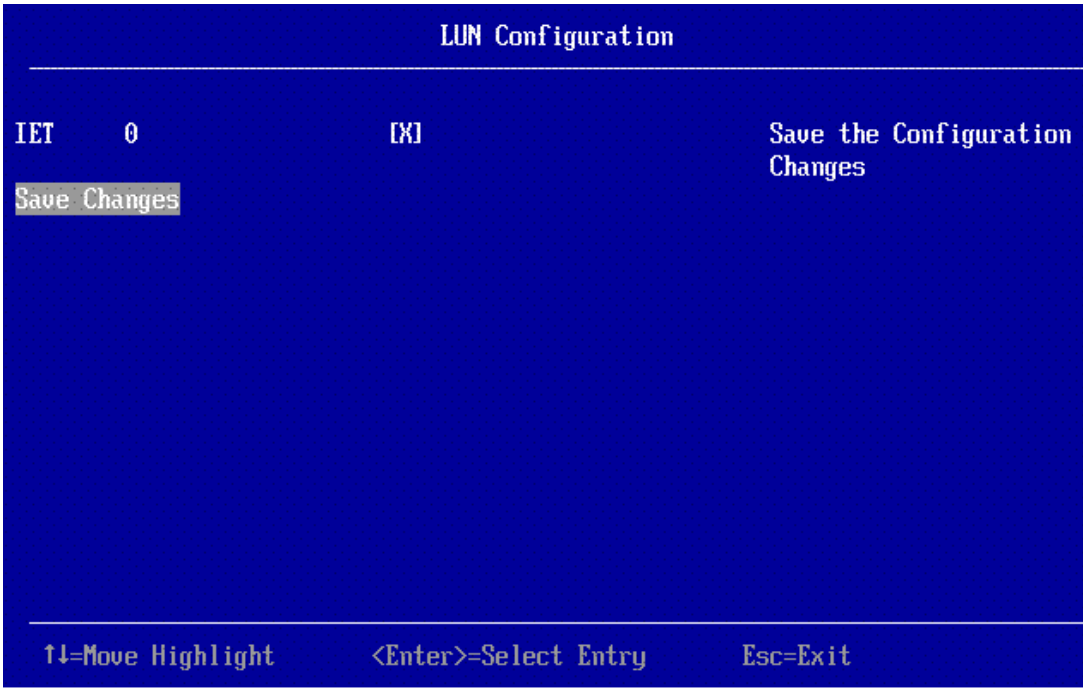

Figure 12-16 LUN Configuration Screen

2. If the target is a boot target, select any single LUN as a boot LUN using the **<Space>** bar.

   Note: If the target is not a boot target, you cannot select any LUNs.

3. Select **Save Changes** and press **<Enter>**.

iSNS Configuration

Note: This functionality is available only on UEFI-capable HP adapters.

The iSNS Protocol allows automated discovery, management, and configuration of iSCSI and FC devices (using iFCP gateways) on a TCP/IP network.

To view the iSNS Configuration screen:

1. On the Controller Configuration Menu screen (Figure 12-2 on page 169), select **iSCSI Target Configuration** and press **<Enter>**. The iSCSI Target Configuration screen (Figure 12-17 on page 188) is displayed.

Figure 12-17 iSCSI Target Configuration Screen

2. Select **iSNS Configuration** and press **<Enter>**. The iSNS Configuration screen (Figure 12-18 on page 188) is displayed.

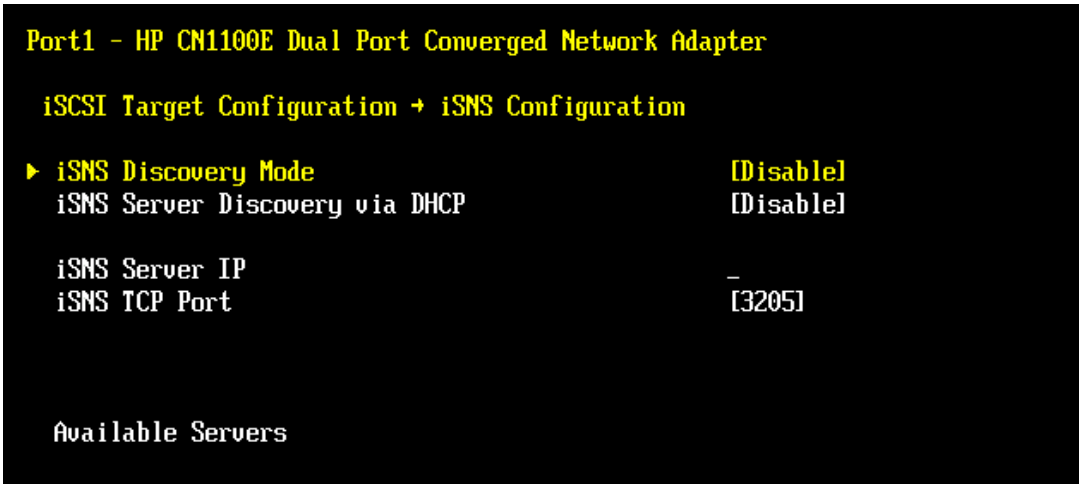
Port1 - HP CN1100E Dual Port Converged Network Adapter
iSCSI Target Configuration → iSNS Configuration
iSNS Discovery Mode [Disable]
iSNS Server Discovery via DHCP [Disable]
iSNS Server IP
iSNS TCP Port [3205]
Available Servers

Figure 12-18 iSNS Configuration Screen

The iSNS Configuration screen enables you to perform the following tasks:

- Enable or disable iSNS discovery mode
- Enable or disable iSNS server discovery using DHCP
- Configure the iSNS server IP address and TCP port number manually
- View a list of available iSNS servers

Enabling iSNS Discovery

This option enables or disables iSNS discovery. iSNS targets are only discovered if this option is enabled.

To enable or disable iSNS discovery:

1. From the iSNS Configuration screen (Figure 12-18 on page 188), select **iSNS Discovery Mode** and press **<Enter>**. The iSNS Discovery Mode screen (Figure 12-19 on page 189) is displayed.

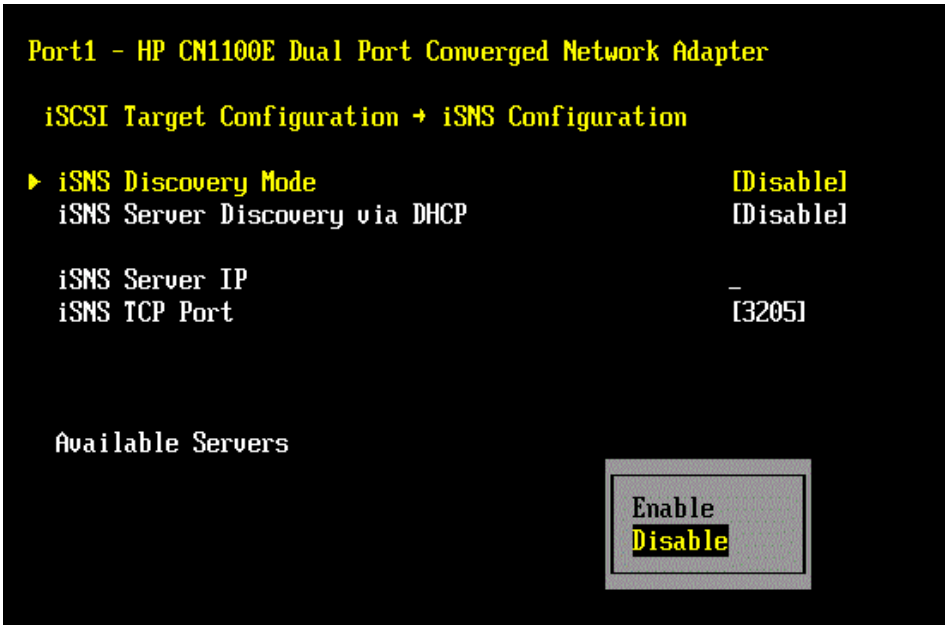
Port1 - HP CN1100E Dual Port Converged Network Adapter
iSCSI Target Configuration → iSNS Configuration
iSNS Discovery Mode [Disable]
iSNS Server Discovery via DHCP [Disable]
iSNS Server IP
iSNS TCP Port [3205]
Available Servers
Enable
Disable

Figure 12-19 iSNS Discovery Mode Screen

2. Select either **Enable** or **Disable** and press **<Enter>**.
3. Press **<F10>** to save the current settings.

Enabling iSNS Server Discovery Using DHCP

This option discovers iSNS servers configured on the network using DHCP.

Note: If you leave iSNS Server Discovery via DHCP disabled (default), you must manually configure the iSNS server.

To enable or disable iSNS server discovery using DHCP:

1. From the iSNS Configuration screen (Figure 12-20 on page 190), select **iSNS Server Discovery via DHCP** and press **<Enter>**. A pop-up menu is displayed.

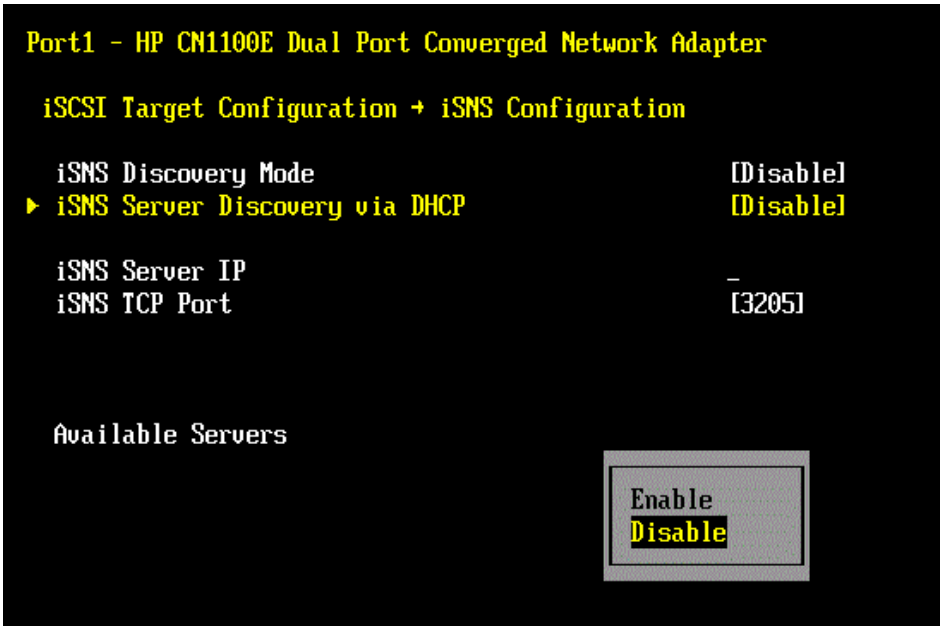
Port1 - HP CN1100E Dual Port Converged Network Adapter
iSCSI Target Configuration → iSNS Configuration
iSNS Discovery Mode [Disable]
iSNS Server Discovery via DHCP [Disable]
iSNS Server IP
iSNS TCP Port [3205]
Available Servers
Enable
Disable

Figure 12-20 iSNS Server Discovery via DHCP Screen

2. Select either **Enable** or **Disable** and press **<Enter>**.
3. Press **<F10>** to save the current settings.

Configuring the iSNS Server IP Address and TCP Port Number Manually

An iSNS server can also be configured manually by entering the server IP address and the TCP port. Only one iSNS server can be configured at present.

Note: This option is available only if the iSNS Server Discovery via DHCP option is disabled.

To add an iSNS server manually:

1. From the iSNS Configuration screen (Figure 12-21 on page 191), select **iSNS Server IP** and press **<Enter>**.

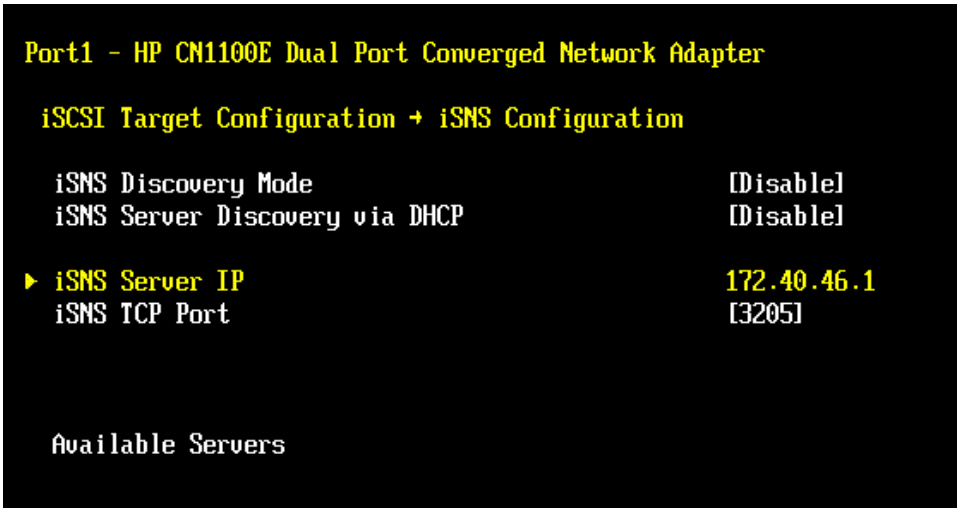
Port1 - HP CN1100E Dual Port Converged Network Adapter
iSCSI Target Configuration → iSNS Configuration
iSNS Discovery Mode [Disable]
iSNS Server Discovery via DHCP [Disable]
iSNS Server IP 172.40.46.1
iSNS TCP Port [3205]
Available Servers

Figure 12-21 iSNS Server IP Screen

2. Enter the iSNS server's IP address and press **<Enter>**.
3. Select **iSNS TCP Port** and press **<Enter>**. The default iSNS Port is 3205. The valid range is 1024 to 65535.
4. Press **<F10>** to save the current settings.

   The added server is displayed under the Available Servers heading on the iSNS Configuration screen (Figure 12-22 on page 191).

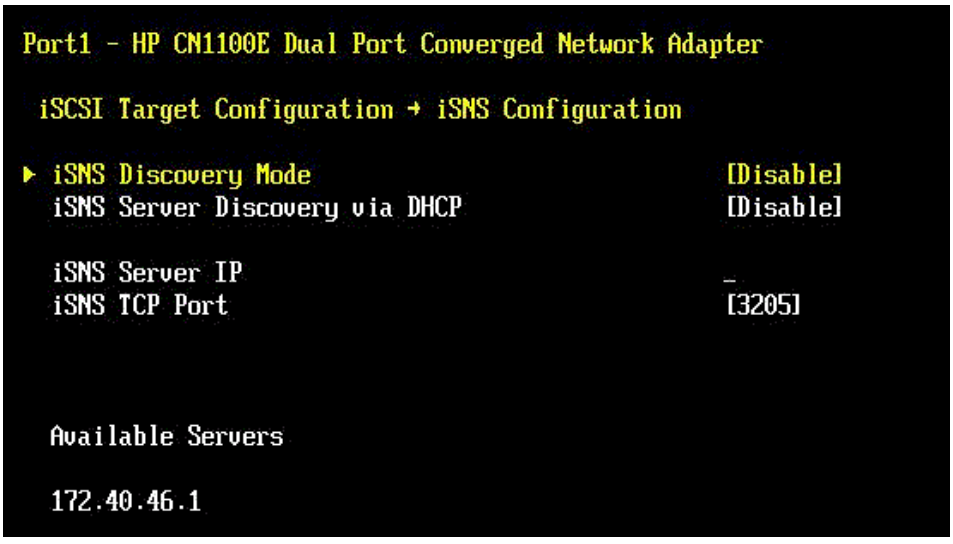
Port1 - HP CN1100E Dual Port Converged Network Adapter
iSCSI Target Configuration → iSNS Configuration
iSNS Discovery Mode [Disable]
iSNS Server Discovery via DHCP [Disable]
iSNS Server IP
iSNS TCP Port [3205]
Available Servers
172.40.46.1

Figure 12-22 Available Servers Screen

Discovering Targets Using the iSNS Server

To configure targets using the iSNS server, from the iSNS Configuration screen (Figure 12-22 on page 191), select the iSNS server under the Available Servers list and press **<Enter>**.The iSNS server IP and TCP port information is displayed (Figure 12-23 on page 192).

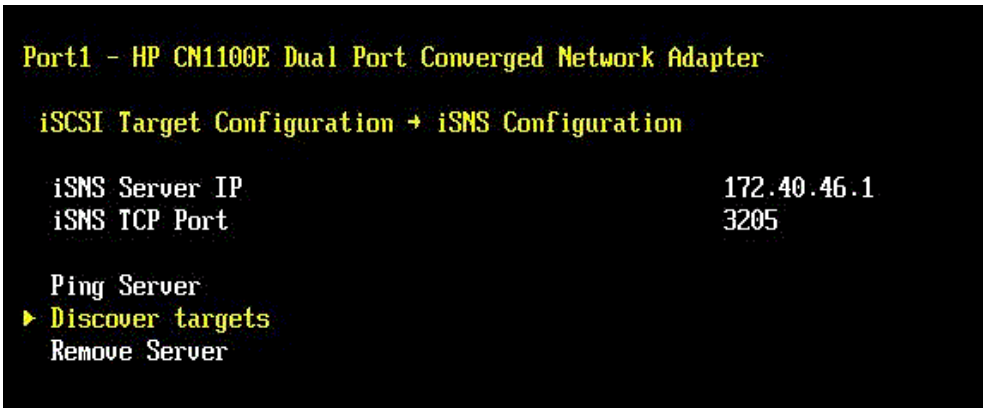
Port1 - HP CN1100E Dual Port Converged Network Adapter
iSCSI Target Configuration → iSNS Configuration
iSNS Server IP 172.40.46.1
iSNS TCP Port 3205
Ping Server
Discover targets
Remove Server

Figure 12-23 iSNS Server Options Screen

The following iSNS server options are available on this screen:

- Ping Server – select this option to check connectivity to the server.
- Discover Targets – select this option to show a list of targets available on the iSNS server.

  One or more targets can be added by logging into the targets individually. All added targets are listed under Discovered Targets on the iSCSI Target Configuration screen (Figure 12-17 on page 188).
- Remove Server – select this option to remove the server from the Available Servers list.

  Note: This removes the server only and not the targets added by this server. To remove the targets, select the target from the Discovered Targets list under the iSCSI Target Configuration screen (Figure 12-17 on page 188), select **Delete Target**, and press **<Enter>**.

Erasing the Configuration

Erase Configuration erases the configuration of a single adapter. Configuration data is erased for both ports on the selected adapter. Erase configuration restores the default settings for that particular adapter only. If an initiator name is global for all adapters, the IQN configured on the first adapter is reflected on all adapters.

Notes

- The Erase Configuration option is not available on HP adapters in HP systems. Instead, use the F7 key to reset the configuration settings to their factory default settings. For HP systems, the initiator name on all ports of the selected adapter are reset to their respective default values.
- You must select **Erase Configuration** to clear out existing IQN data if you purchase a different or subsequent license for the adapter.

To erase an adapter configuration:

1. From the Controller Configuration Menu screen (Figure 12-2 on page 169), select **Erase Configuration** and press **<Enter>**. A warning message is displayed asking for confirmation (Figure 12-24 on page 193).

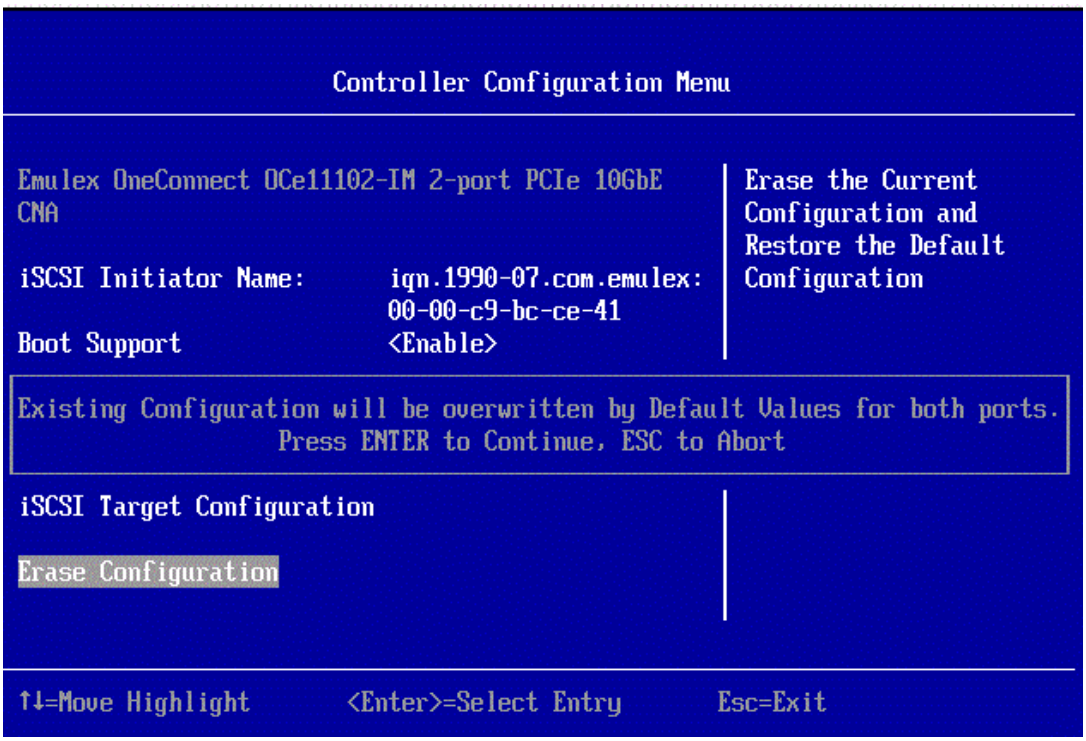
Controller Configuration Menu
Emulex OneConnect OCe11102-IM 2-port PCIe 10GbE CNA
iSCSI Initiator Name:
iqn.1990-07.com.emulex:00-00-c9-bc-ce-41
Boot Support
<Enable>
Erase the Current Configuration and Restore the Default Configuration
Existing Configuration will be overwritten by Default Values for both ports.
Press ENTER to Continue, ESC to Abort
iSCSI Target Configuration
Erase Configuration
↑↓=Move Highlight
<Enter>=Select Entry
Esc=Exit

Figure 12-24 Erase Configuration Screen

2. Press **<Enter>** to erase the configuration, or press **<Esc>** to abort the operation.

   When the adapter configuration is erased, the Controller Configuration Menu screen (Figure 12-2 on page 169) is displayed.

13. Configuring UEFI for FCoE

Note: If you have several adapters in your system, the UEFI system firmware or boot code uses the highest version driver installed on any of the adapters. Adapters with older versions of EFIBoot are managed by the more recent version, but only as long as the adapter with the most recent version is in the system. The latest firmware and boot code must be installed on each adapter in the system to ensure that each adapter runs the latest firmware and boot code.

UEFIBoot supports:

- Only Fabric point to-point topology is supported.
- All applicable UEFI 2.3 driver protocols
- All UEFI-aware operating systems
- Selectable fibre or SCSI device path through the driver configuration application
- Up to 256 ports are supported
- Up to eight boot targets are selectable through the driver configuration application
- Up to 4096 LUNs
- Multi-utility – setup and firmware updates are supported

The Emulex FCoE UEFIboot is loaded from flash into system memory.

To verify that the Emulex UEFIBoot driver is loaded, enter the UEFI Shell, type "`drivers`", and then press **<Enter>**.

Note: If you are using a Dell adapter, see appendix F., "Dell UEFI," on page 268 for information on using the Dell UEFI utility.

Navigating the Emulex FCoE Configuration Utility

The Emulex FCoE configuration utility has menus and configuration screens. Use the following methods to navigate them:

- Press the up and down arrows on the keyboard to move through and select menu options or configuration fields. If multiple adapters are listed, use the up and down arrows to scroll to the additional adapters.
- Press the **<+>**, **<->**, or **<Enter>** keys to change numeric values.
- Press **<Enter>** to select a menu option, to select a row in a configuration screen, or to change a configuration default.
- Use the navigation entries on the page to move about the utility.
- Press **<Esc>** to exit the current screen and show the previous screen.
- Select **Commit** to save changes. Select **Discard** to not save changes.
- Select **Back to Display Adapters and RECONNECT DEVICES** from the Emulex Adapter Configuration Main Menu when you are finished to ensure

that the changes are made active; otherwise, a system restart is required to make your changes active. You are then returned to the adapter list.

Starting the Emulex FCoE Configuration Utility

Depending on the vendor UEFI configuration, the Emulex FCoE configuration utility may appear under different setup menus in the vendor system firmware or BIOS (such as **System Settings > Storage**). The following instructions apply to systems where the Emulex utility is found in the Device Manager.

To start the Emulex FCoE configuration utility using HII:

1. Exit the UEFI shell (Figure 13-1 on page 195). A front page is displayed.

Figure 13-1 Exiting the UEFI Shell

2. Launch the Device Manager. On the Device Manager screen (Figure 13-2 on page 195), a list of all the adapters in the system is displayed. Your list may vary depending on the installed adapters.

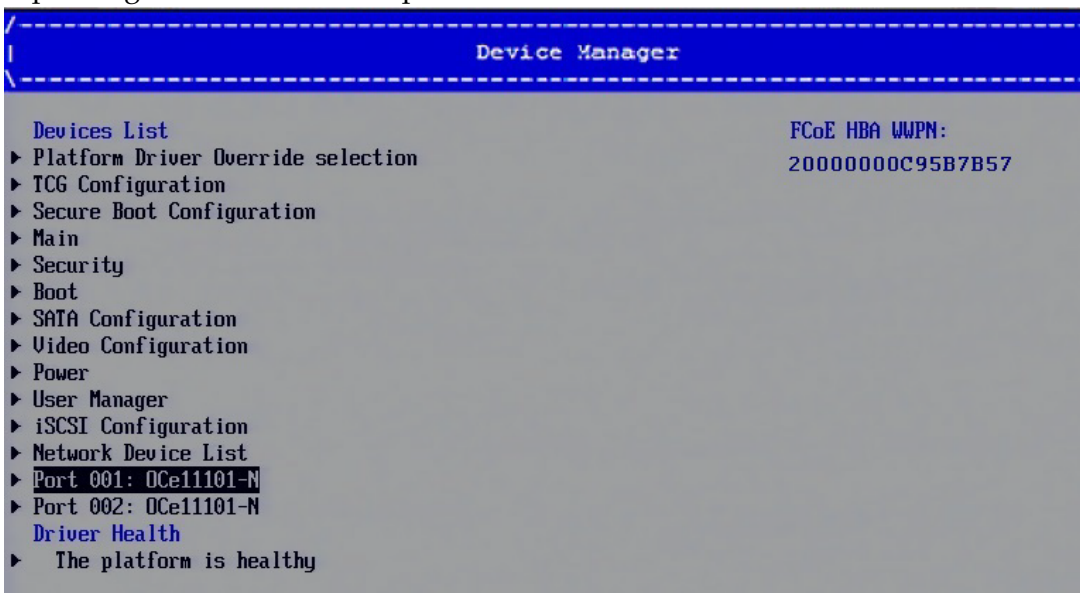

Figure 13-2 Device Manager Screen

3. Select the adapter you want to configure and press **<Enter>**.

   The Emulex Adapter Configuration main menu screen (Figure 13-3 on page 196 and Figure 13-4 on page 196) is displayed.

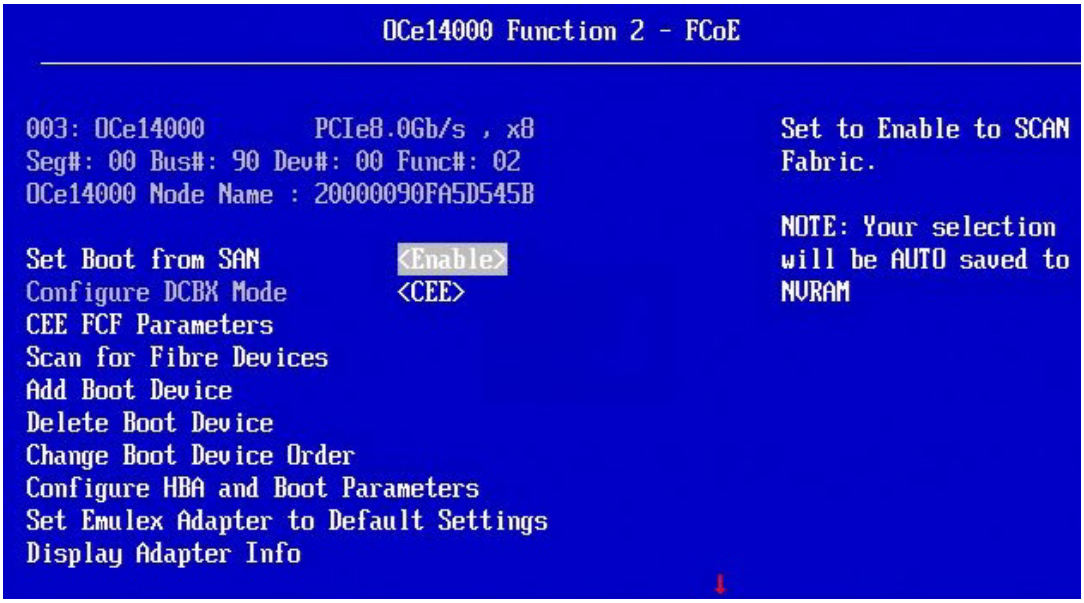
OCe14000 Function 2 - FCoE
003: OCe14000 PCIe8.0Gb/s , x8
Seg#: 00 Bus#: 90 Dev#: 00 Func#: 02
OCe14000 Node Name : 20000090FA5D545B
Set Boot from SAN <Enable>
Configure DCBX Mode <CEE>
CEE FCF Parameters
Scan for Fibre Devices
Add Boot Device
Delete Boot Device
Change Boot Device Order
Configure HBA and Boot Parameters
Set Emulex Adapter to Default Settings
Display Adapter Info
Set to Enable to SCAN Fabric.
NOTE: Your selection will be AUTO saved to NVRAM

Figure 13-3 Emulex Adapter Configuration Main Menu Screen

OCe14000 Function 2 - FCoE
OCe14000 Node Name : 20000090FA5D545B
Set Boot from SAN <Enable>
Configure DCBX Mode <CEE>
CEE FCF Parameters
Scan for Fibre Devices
Add Boot Device
Delete Boot Device
Change Boot Device Order
Configure HBA and Boot Parameters
Set Emulex Adapter to Default Settings
Display Adapter Info
Legacy Only Configuration Settings
Back to Display Adapters and RECONNECT DEVICES
Legacy Only Configuration Settings

Figure 13-4 Emulex Adapter Configuration Main Menu Screen - Extended

Note: The DCBX mode is always set to CEE and cannot be configured.

Updating Firmware and Boot Code

To update the firmware and boot code to the latest versions, you must use the NIC firmware update utility, which revises the FCoE function with a single firmware and boot code image. For more information on revising firmware versions, see chapter 11., "Configuring UEFI for Ethernet," on page 127.

Enabling an Adapter to Boot from SAN

To enable an adapter to boot from SAN:

1. From the Device Manager screen (Figure 13-2 on page 195), select the adapter whose network boot setting you want to change and press **<Enter>**. The Emulex Adapter Configuration main menu screen (Figure 13-3 on page 196) is displayed.
2. Select **Set Boot from SAN** and press **<Enter>**. A pop-up menu is displayed.
3. Select **Enable** and press **<Enter>**.The selection is changed to NVRAM and the current setting is displayed.

Configuring CEE FCF Parameters

To configure CEE FCF parameters:

1. From the Device Manager screen (Figure 13-2 on page 195), select the adapter to configure and press **<Enter>**. The Emulex Adapter Configuration main menu screen (Figure 13-3 on page 196) is displayed.
2. Select **Configure CEE FCF Parameters** and press **<Enter>**. A listing of current CEE FCF record information is displayed (Figure 13-5 on page 198).

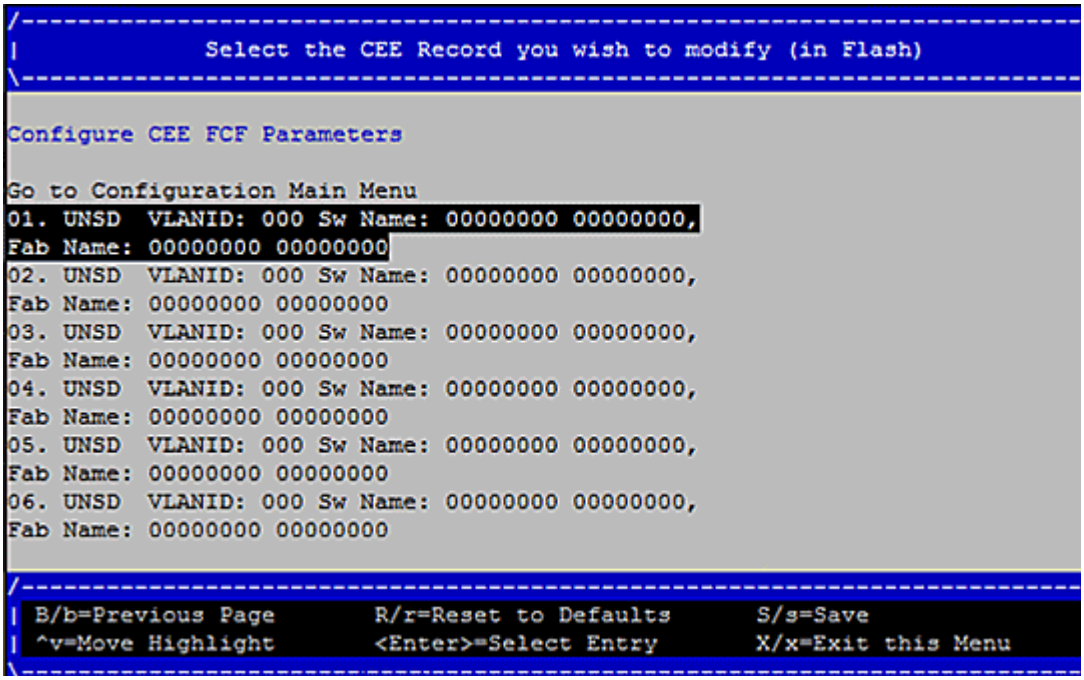
Select the CEE Record you wish to modify (in Flash)
Configure CEE FCF Parameters
Go to Configuration Main Menu
01. UNSD VLANID: 000 Sw Name: 00000000 00000000,
Fab Name: 00000000 00000000
02. UNSD VLANID: 000 Sw Name: 00000000 00000000,
Fab Name: 00000000 00000000
03. UNSD VLANID: 000 Sw Name: 00000000 00000000,
Fab Name: 00000000 00000000
04. UNSD VLANID: 000 Sw Name: 00000000 00000000,
Fab Name: 00000000 00000000
05. UNSD VLANID: 000 Sw Name: 00000000 00000000,
Fab Name: 00000000 00000000
06. UNSD VLANID: 000 Sw Name: 00000000 00000000,
Fab Name: 00000000 00000000
B/b=Previous Page
R/r=Reset to Defaults
S/s=Save
^v=Move Highlight
<Enter>=Select Entry
X/x=Exit this Menu

Figure 13-5 CEE Record Selection List Screen

3. Select the CEE FCF record to modify and press **<Enter>**. The current record information is displayed (Figure 13-6 on page 198).

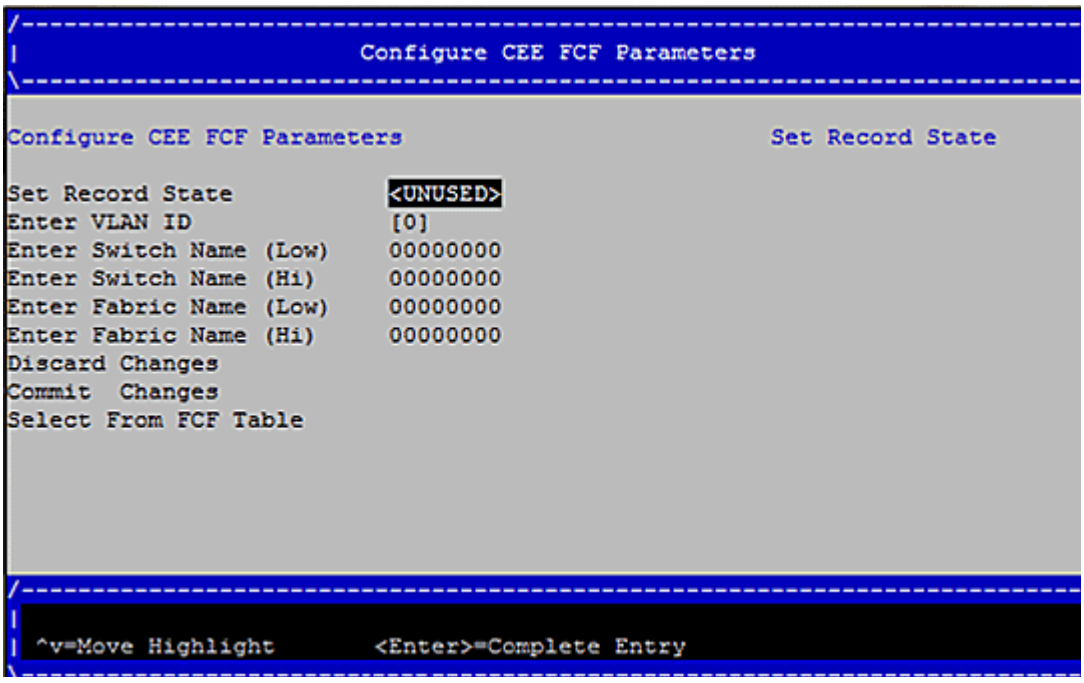

Figure 13-6 CEE FCF Record Information Screen

4. Change the record information as needed.
   - Set Record State can be set to unused, active, or boot.

- VLAN ID must be a three digit hexadecimal number.
- Switch Name (Low). Enter the low bits of the FC switch's WWN to which to connect. This must be an 8-digit hexadecimal number.
- Switch Name (Hi). Enter the high bits of the FC switch's WWN to which to connect. This must be an 8-digit hexadecimal number.
- Fabric Name (Low). Enter the low bits of the FC fabric's WWN to which to connect. This must be an 8-digit hexadecimal number.
- Fabric Name (Hi). Enter the high bits of the FC fabric's WWN to which to connect. This must be an 8-digit hexadecimal number.

5. Do one of the following:
   - To save your changes, select **Commit Changes** and press **<Enter>**. The changed CEE FCF record information is displayed.
   - To discard all changes, select **Discard Changes** and press **<Enter>**. The CEE record selection list screen is displayed (Figure 13-5 on page 198).
   - To discard your changes and use the CEE parameters from the FCF table, select **Select From FCF Table** and press **<Enter>**. The FCF table parameters are displayed.
6. Press **<Enter>**. The Emulex Adapter Configuration main menu screen (Figure 13-3 on page 196) is displayed.

Scanning for Fibre Devices

When LUNs are set up on the SAN before POST has completed (that is, before the boot driver has been started), you can select **Scan for Fibre Devices** or **Add Boot Device** to discover all available LUNs. Although this procedure does not perform a complete HBA initialization, it executes faster than selecting **Reconnect Devices**.

Notes

- If you dynamically add LUNs after POST has completed and the driver has been started, you must select **Reconnect Devices** to perform a complete HBA initialization and discovery. If this step is not performed, all LUNs may not be properly discovered.
- Select **Reconnect Devices** after adding any discovered LUNs to the NVRAM list.

To scan for fibre devices:

1. From the Device Manager screen (Figure 13-2 on page 195), select the adapter that you want to scan for fibre devices and press **<Enter>**. The Emulex Adapter Configuration main menu screen (Figure 13-3 on page 196) is displayed.
2. Select **Scan for Fibre Devices** and press **<Enter>**. A list of discovered targets is displayed. This is a list of discovered target devices to quickly determine SAN connectivity only and provide you with a mechanism to have the port logged in for zoning.

Adding Boot Devices

To add a boot device:

1. From the Device Manager screen (Figure 13-2 on page 195), select the adapter to which you want to add a boot device and press **<Enter>**. The Emulex Adapter Configuration main menu screen (Figure 13-3 on page 196) is displayed.
2. Select **Add Boot Device** and press **<Enter>**. A list of discovered targets is displayed (Figure 13-7 on page 200).

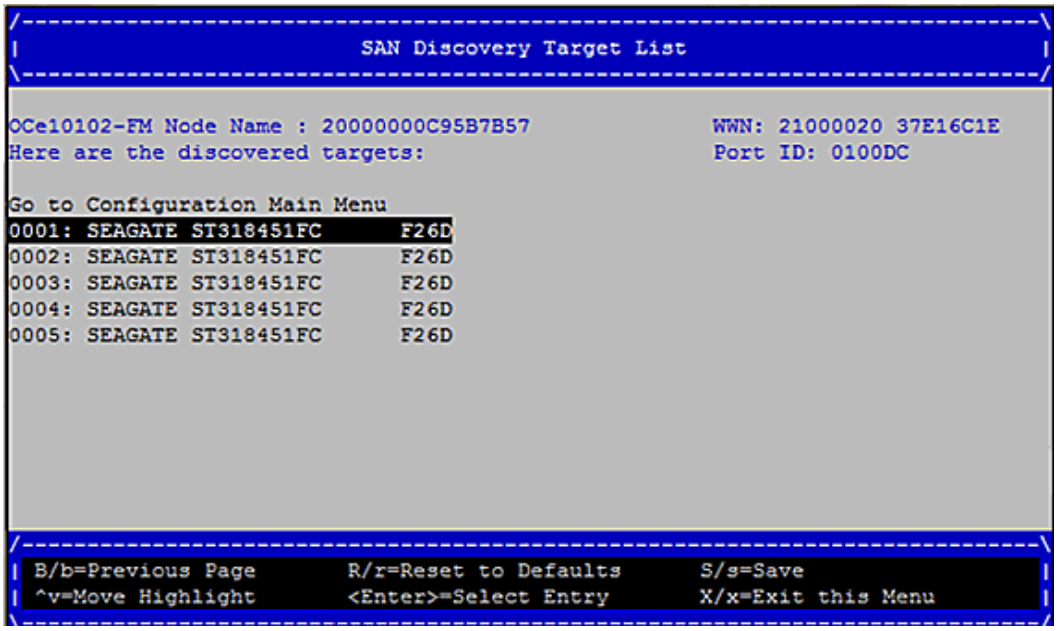

Figure 13-7 SAN Discovery Targets List Screen

3. Select a target and press **<Enter>**. The LUN list is displayed (Figure 13-8 on page 201).

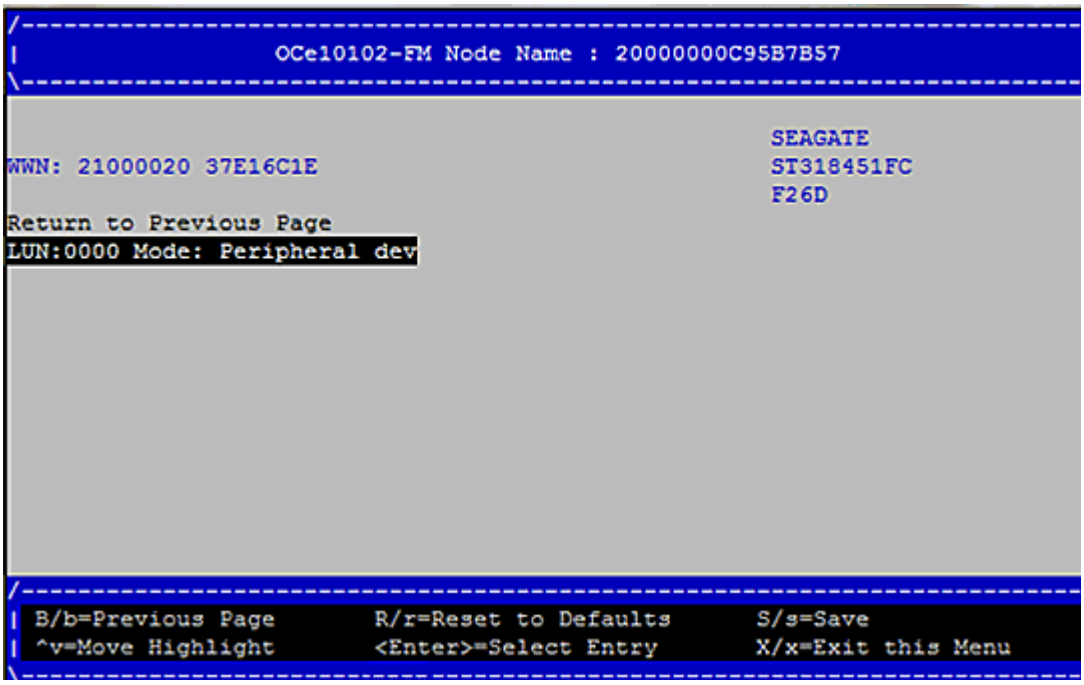

Figure 13-8 LUN Listing Screen

4. Select a LUN from the list and press **<Enter>**. The SAN Discovery Target List screen (Figure 13-9 on page 201) is displayed.

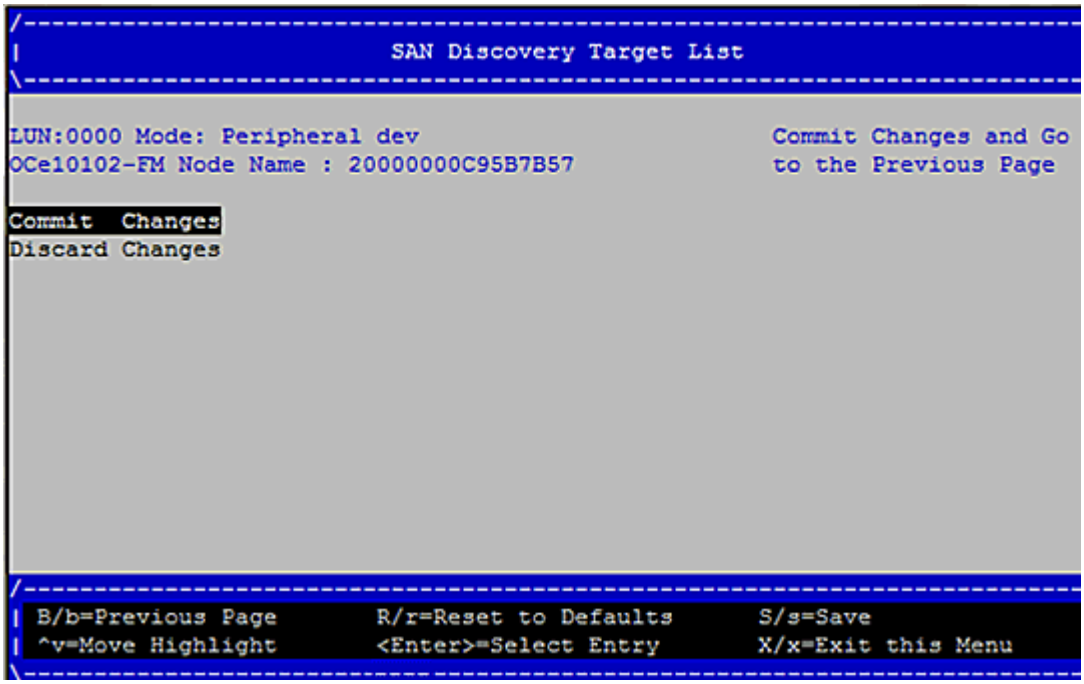

Figure 13-9 SAN Discovery Target List Screen

5. Select **Commit Changes** and press **<Enter>** to return to the Emulex Adapter Configuration main menu screen.

Deleting Boot Devices

To delete a boot device:

1. From the Device Manager screen (Figure 13-2 on page 195), select the adapter from which you want to delete a boot device and press **<Enter>**. The Emulex Adapter Configuration Main Menu (Figure 13-3 on page 196) is displayed.
2. Select **Delete Boot Device** and press **<Enter>**. A list of eight boot devices is displayed.
3. Select the device and press **<Enter>**. The Delete Boot Device screen for that device is displayed (Figure 13-10 on page 202).

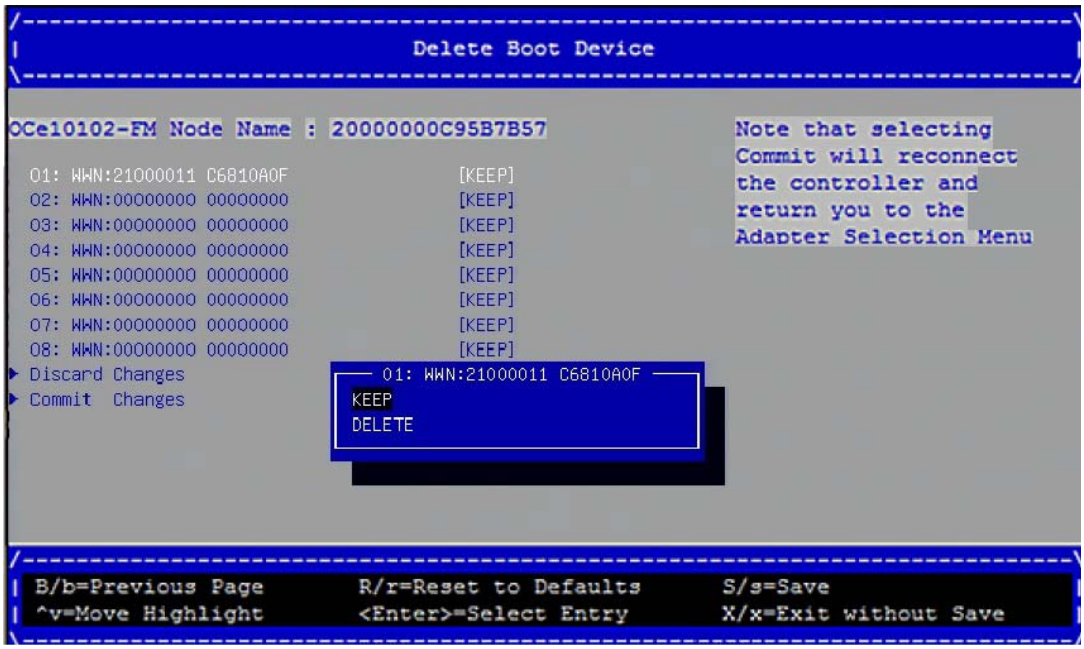

Figure 13-10 Delete Boot Device Screen

4. Select **DELETE** and press **<Enter>.**
5. Select **Commit Changes** and press **<Enter>** to return to the Emulex Adapter Configuration main menu screen.

Changing Boot Device Order

Note: The boot device order has no relationship to the system BIOS boot device order. Changing the boot device order with this procedure only changes the order that the devices are discovered by UEFIBoot.

To change the boot device order:

1. From the Device Manager screen (Figure 13-2 on page 195), select the adapter whose boot device order you want to change and press **<Enter>**. The Emulex Adapter Configuration main menu screen (Figure 13-3 on page 196) is displayed.

2. Select **Change Boot Device Order** and press **<Enter>**. The Change Boot Device Order screen (Figure 13-11 on page 203) is displayed.
3. Select **Boot Device Order** and press **<Enter>**.

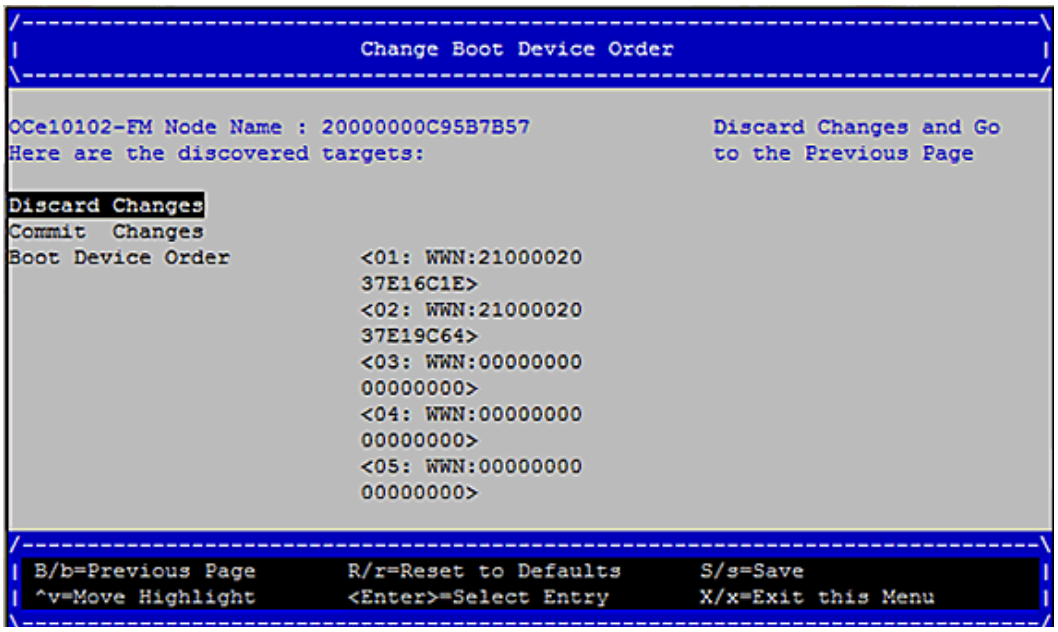

Figure 13-11 Change Boot Device Order Screen

4. Select a device from the list of eight boot devices and press **<Enter>**.

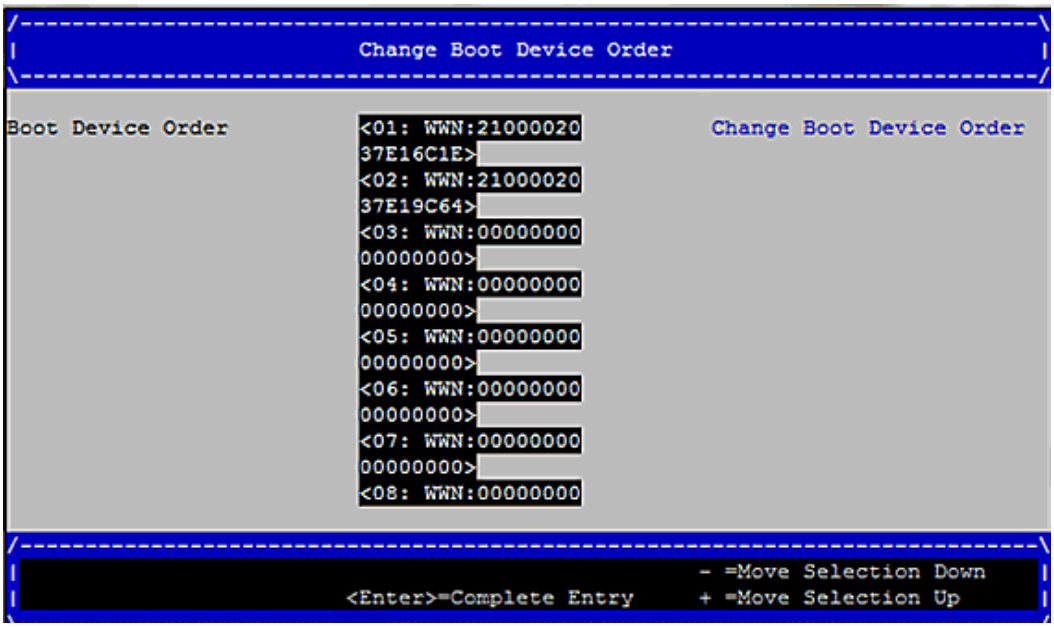

Figure 13-12 Boot Device Order Screen

5. Use the <+> or <-> keys to change the order of the selected device on the dialog box and press **<Enter>**. An updated Change Boot Device Order screen (Figure 13-13 on page 204) displays the new boot device order.

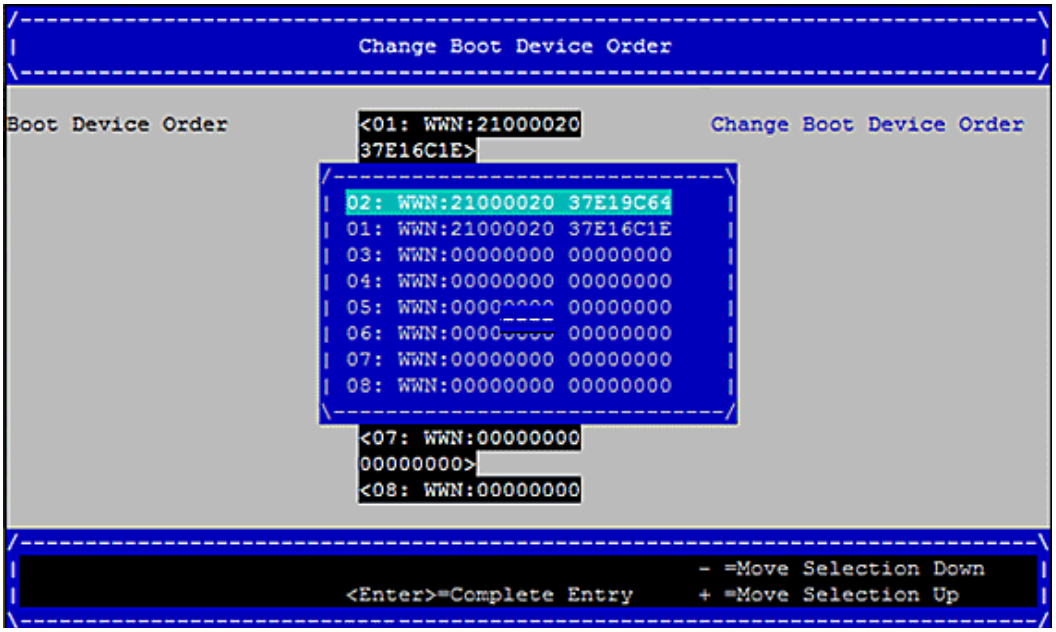

Figure 13-13 Change Boot Device Order Screen with Revised Boot Order

6. Verify that the boot device list order is correct. Press **<Enter>**.
7. Select **Commit Changes** and press **<Enter>**. The revised order is saved to the NVRAM. The Emulex Adapter Configuration main menu screen (Figure 13-3 on page 196) is displayed.
8. Select **Back to Display Adapters and RECONNECT DEVICES** to complete configuration or select another configuration option.

Configuring Adapter Parameters

This section explains how to configure an adapter's boot parameters.

Changing the Port Login Retry Timer

This option allows you to set the interval for the port login retry timer. This option is especially useful for Tachyon-based RAID arrays. Under very rare occasions, a Tachyon-based RAID array resets itself and the port goes offline temporarily in the loop. When the port comes to life, the port login retry interval scans the loop to discover this device.

You can choose:

- Disable (default setting)
- 50 Msec
- 100 Msec
- 200 Msec

To change timer values:

1. From the Device Manager screen (Figure 13-2 on page 195), select the adapter to configure and press **<Enter>**. The Emulex Adapter Configuration main menu screen (Figure 13-3 on page 196) is displayed.
2. Select **Configure HBA Parameters** and press **<Enter>**. The Configure HBA Parameters screen is displayed.
3. Select **PLOGI Retry Timer** and press **<Enter>**. The Port Login Retry Timer pop-up menu (Figure 13-14 on page 205) is displayed.

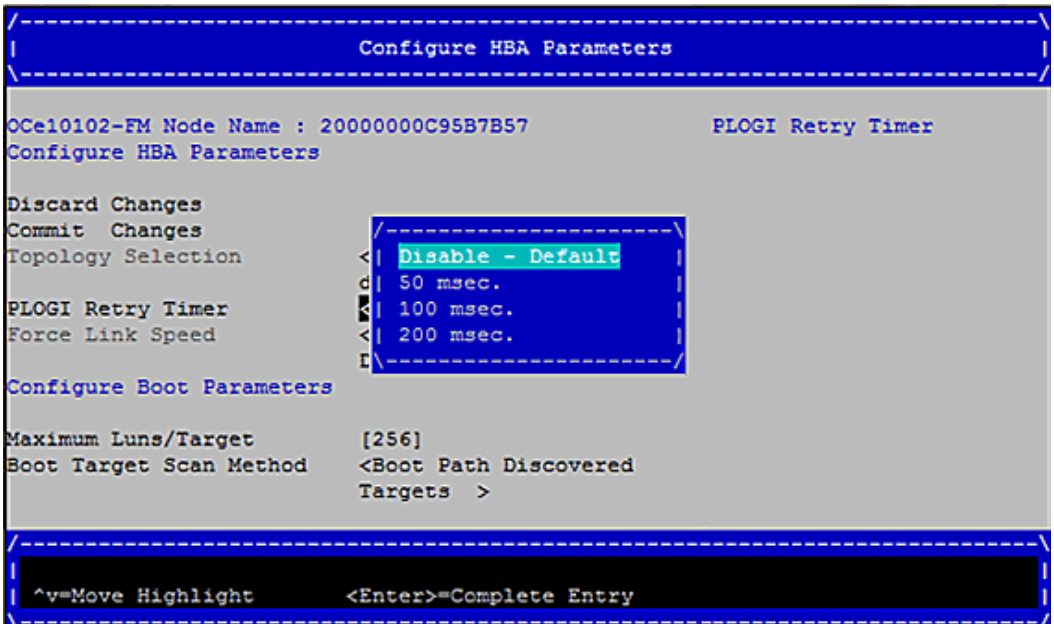

Figure 13-14 Configure HBA Parameters Screen – Port Login Retry Timer Pop-up Menu

4. Select a retry timer option and press **<Enter>**. The screen is refreshed with the modified value.

   Note: Press **<Esc>** to return to the UEFI utility menu.

5. Select **Commit Changes** and press **<Enter>** to save the changes and return to the Emulex Adapter Configuration main menu screen.

Changing the Maximum LUNs per Target

The maximum number of LUNs represents the maximum number of LUNs that are polled during device discovery. The minimum value is 1 and the maximum value is 4096. The default is 256.

To change the maximum number of LUNs:

1. From the Device Manager screen (Figure 13-2 on page 195), select the adapter whose LUNs per target information you want to change and press **<Enter>**. The Emulex Adapter Configuration main menu screen (Figure 13-3 on page 196) is displayed.

2. Select **Configure HBA Parameters** and press **<Enter>**. The Configure HBA Parameters screen (Figure 13-15 on page 206) is displayed.
3. Select **Maximum LUNs/Target** and press **<Enter>**.

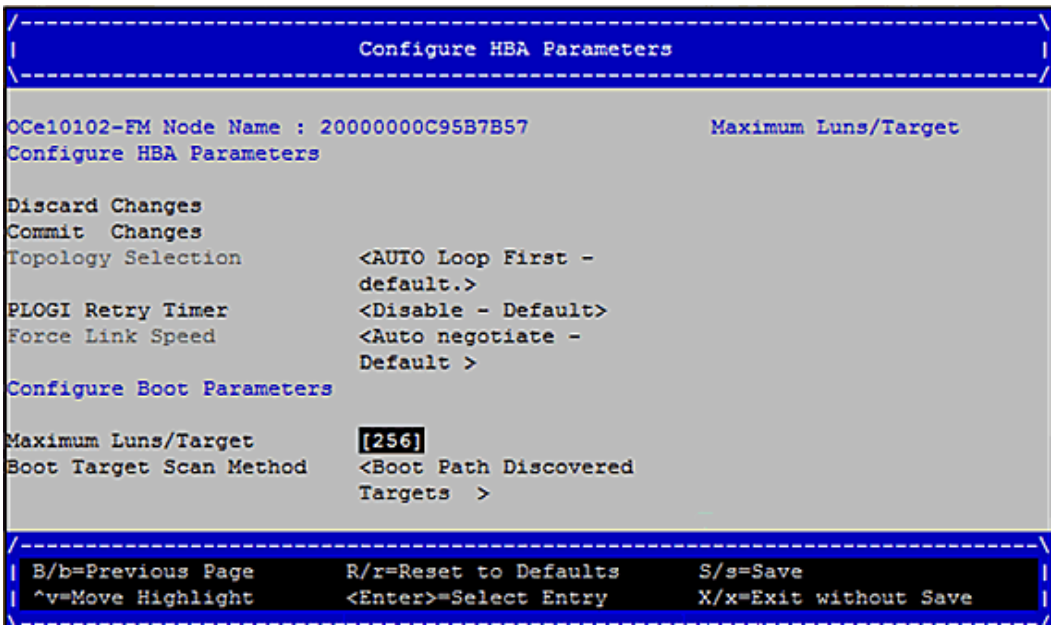

Figure 13-15 Configure HBA Parameters Screen

4. Enter a number from 1 to 4096 and press **<Enter>**. The screen is refreshed with the modified value.

   Note: The default and typical maximum number of LUNs in a target device is 256. A higher number of maximum LUNs causes the discovery to take more time.

5. Select **Commit Changes** and press **<Enter>** to save the changes and return to the Emulex Adapter Configuration main menu screen.

Changing Boot Target Scan Method

This option is available only if none of the eight boot entries is configured to boot from the DID or WWPN. The Emulex Adapter Configuration main menu screen is used to configure up to eight boot entries. With boot scan enabled, the first device issues a Name Server Inquiry.

The boot scan options are:

- Boot Path from NVRAM Targets – Boot scan discovers LUNs that are saved to the adapter's NVRAM only. Select up to eight attached devices to use as potential boot devices. Limiting discovery to a set of eight selected targets can greatly reduce the time it takes for the EFIBoot driver to complete discovery.
- Boot Path from Discovered Targets – Boot scan discovers all devices that are attached to the FC port. Discovery can take a long time on large SANs if this option is used.

- Do not create boot path.
- EFIFCScanLevel: NVRAM Targets – Boot scan sets the EFIFCScanLevel environment variable to inform the driver to configure targets in the NVRAM boot table only.
- EFIFCScanLevel - Discovered Targets – Boot scan sets the EFIScanLevel environment variable to inform the driver to configure all available targets on the SAN.

To change the boot target scan method:

1. From the Device Manager screen (Figure 13-2 on page 195), select the adapter whose boot target scan method you want to change and press **<Enter>**. The Emulex Adapter Configuration main menu screen (Figure 13-3 on page 196) is displayed.
2. Select **Configure HBA Parameters** and press **<Enter>**. The Configure HBA Parameters screen (Figure 13-15 on page 206) is displayed.
3. Select **Boot Target Scan Method** and press **<Enter>**. The Boot Target Scan Method pop-up menu (Figure 13-16 on page 207) is displayed.

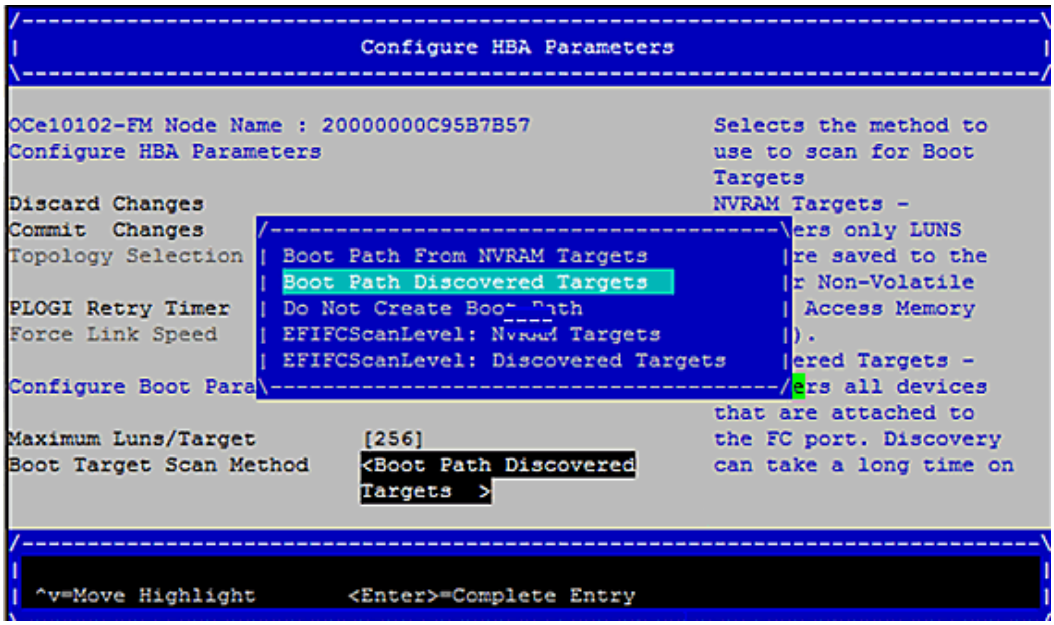
Configure HBA Parameters
OCe10102-FM Node Name : 20000000C95B7B57
Configure HBA Parameters
Discard Changes
Commit Changes
Topology Selection
PLOGI Retry Timer
Force Link Speed
Configure Boot Para
Maximum Luns/Target
[256]
Boot Target Scan Method
<Boot Path Discovered Targets >
Boot Path From NVRAM Targets
Boot Path Discovered Targets
Do Not Create Boot Path
EFIFCScanLevel: NVRAM Targets
EFIFCScanLevel: Discovered Targets
Selects the method to use to scan for Boot Targets
NVRAM Targets - ers only LUNS re saved to the r Non-Volatile Access Memory).
ered Targets - ers all devices that are attached to the FC port. Discovery can take a long time on
^v=Move Highlight
<Enter>=Complete Entry

Figure 13-16 Configure HBA Parameters Screen – Boot Target Scan Method Pop-up Menu

4. Select a boot scan option and press **<Enter>**. The screen is refreshed with the modified value.

   Note: If you have a large SAN and set the boot path to "Boot Path Discovered Targets," discovery takes a long time. Press **<Esc>** to return to the UEFI utility menu.

5. Select **Commit Changes** and press **<Enter>** to save the changes and return to the Emulex Adapter Configuration main menu screen.

Changing Device Discovery Delay

This parameter sets a delay to occur after an loop initialization and before a scan is initiated to discover the target. The default is off or 0 seconds. Change the default if you have an HP MSA1000 or HP MSA1500 RAID array, and if both of the following conditions exist:

- The MSA array is direct connected or part of an arbitrated loop (for example, daisy chained with a JBOD).
- The boot LUN is not reliably discovered. In this case, a delay may be necessary to allow the array to complete a reset.

Caution: Do not change the delay device discovery time if the MSA array is connected to a fabric switch. Setting it to any other time guarantees that the maximum delay time is seen on every loop initialization.

If both of the above conditions exist, typically set this parameter to 20 seconds. However, the delay should be only long enough for the array to be reliably discovered after a reset. Your value may be different.

To change the delay device discovery value:

1. From the Device Manager screen (Figure 13-2 on page 195), select the adapter whose device discovery delay settings you want to change and press **<Enter>**. The Emulex Adapter Configuration main menu screen (Figure 13-3 on page 196) is displayed.
2. Select **Configure HBA Parameters** and press **<Enter>**. The Configure HBA Parameters screen (Figure 13-17 on page 208) is displayed.
3. Select **Delay Device Discovery** and press **<Enter>**.

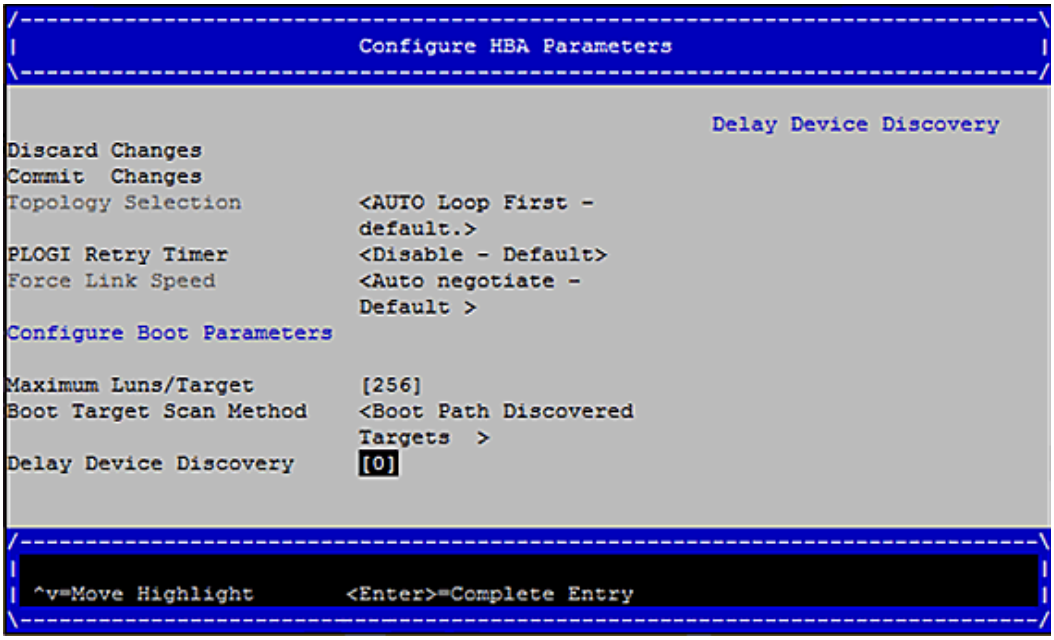

Figure 13-17 Configure HBA Parameters Screen – Delay Device Discovery

4. Use the +/- keys to change the delay device discovery value in increments of 10 seconds and press **<Enter>**. The screen is refreshed with the modified value.
5. Select **Commit Changes** and press **<Enter>** to save the changes and return to the Emulex Adapter Configuration main menu screen.

Resetting Emulex Adapters to Default Values

The UEFI utility enables you to clear the NVRAM target list and set all boot device WWNNs back to 0, along with setting the adapter back to the default values. These default values are listed in Table 13-1.

Table 13-1 Adapter Default Values

Parameter	Default Value	Valid Values
Enable/Disable BIOS	Disabled	Enabled Disabled
Port Login Retry Timer	Disabled	Disabled 50 msec 100 msec 200 msec
Boot Target Scan	Boot path from NVRAM targets	Boot path from NVRAM targets Boot path discovered targets Do not create boot path
Maximum LUNs Setting	0256	0–4096
Delay Device Discovery	0000	0000–0255
Advanced Mode	Enabled (OCe11100-series and the LPe16202/OCe15100 CNA)	Enabled Disabled
PXE Boot Support	The default for this parameter varies depending on the vendor configuration.	Enabled Disabled
SR-IOV	Disabled	Enabled Disabled
VLAN Support	Disabled	Enabled Disabled
VLAN ID	0	0–4094
VLAN Priority	0	0–7
UMC Support	The default for this parameter varies depending on the vendor configuration.	Enabled Disabled
Function En/Dis	Disabled	Enabled Disabled
Bandwidth	0%	Must have a total of 100% across all ports.

Table 13-1 Adapter Default Values (Continued)

Parameter	Default Value	Valid Values
LPVID	0	2–4094
Switch Option (IBM Virtual Fabric-capable configuration, if available)	IBM Virtual Fabric Mode	IBM Virtual Fabric Mode IBM Unified Fabric Protocol Mode Switch Independent Mode

Note: The following example sets the default values for FC/FCoE adapters only. To set other adapters to their default settings, you must use the utility for that specific protocol.

To set Emulex adapters to their default settings:

1. From the Device Manager screen (Figure 13-2 on page 195), select the adapter whose default settings you want to change and press **<Enter>**. The Emulex Adapter Configuration main menu screen (Figure 13-3 on page 196) is displayed.
2. Select **Set Emulex Adapter to Default Settings** and press **<Enter>**. The Set Emulex Adapter to Default Settings screen (Figure 13-18 on page 210) is displayed.

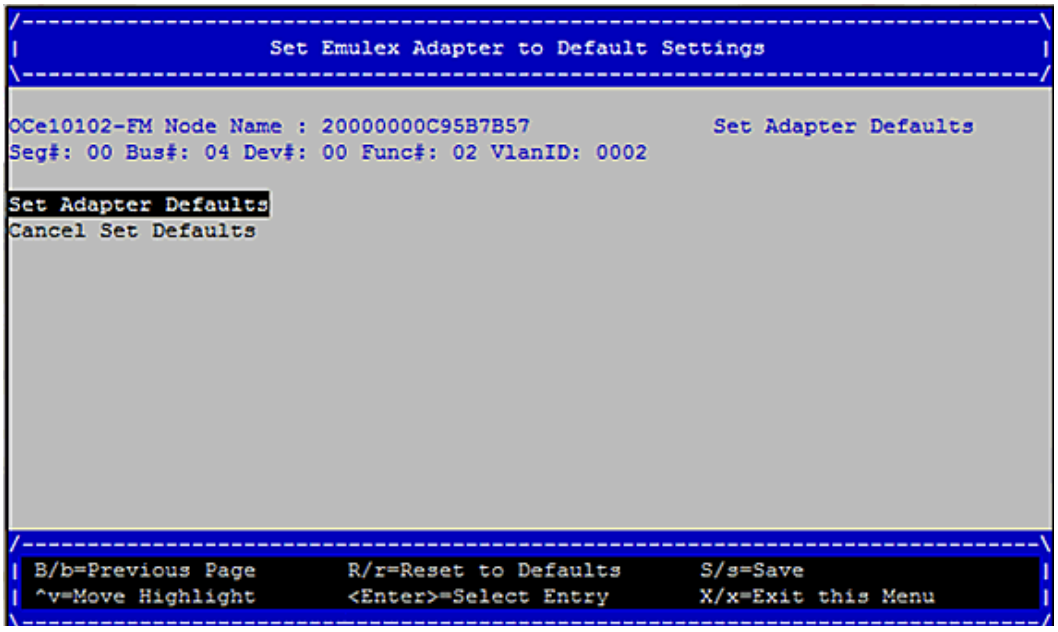

Figure 13-18 Set Adapter Defaults Screen

Note: This will set the adapter to the FCoE driver default settings only.

3. Select **Set Adapter Defaults** and press **<Enter>** to set the adapter back to its default values. The Emulex Adapter Configuration main menu screen (Figure 13-3 on page 196) is displayed.
4. Select **Back to Display Adapters and RECONNECT DEVICES** to complete configuration or select another configuration option.

Displaying Adapter Information

The Adapter Information screen displays the following information about the selected adapter:

- Adapter status
- Network boot status
- Link speed
- Topology
- Firmware version

  Note: Refer to this firmware version if reporting an issue to Emulex Technical Support.

- Universal boot version
- EFI Boot version

To show adapter information:

1. From the Device Manager screen (Figure 13-2 on page 195), select the adapter whose information you want to view and press **<Enter>**. The Emulex Adapter Configuration main menu screen (Figure 13-3 on page 196) is displayed.
2. Select **Display Adapter Info** and press **<Enter>**. Information about the selected adapter is displayed (Figure 13-19 on page 211).

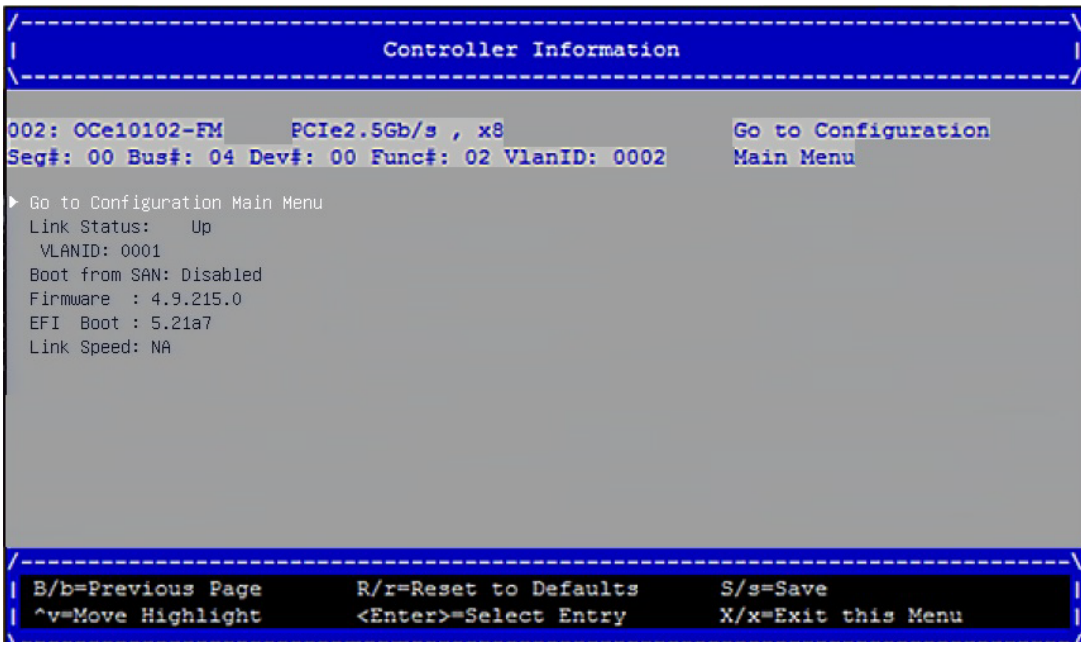

Figure 13-19 Controller Information Screen

Configuring Legacy Only Settings

Configuration settings for some adapters are available only through the Legacy Only Configuration Settings screen. The configuration settings include:

- Enabling or disabling spinup delay
- Enabling or disabling EDD 3.0
- Enabling or disabling start unit command
- Enabling or disabling environment variable
- Enabling or disabling auto boot sector
- Configuring the auto scan setting

To configure any of these settings:

1. From the Emulex Adapter Configuration main menu screen (Figure 13-3 on page 196), select Legacy Only Configuration Settings and press **<Enter>**. The Legacy Only Configuration Settings screen is displayed (Figure 13-20 on page 212).

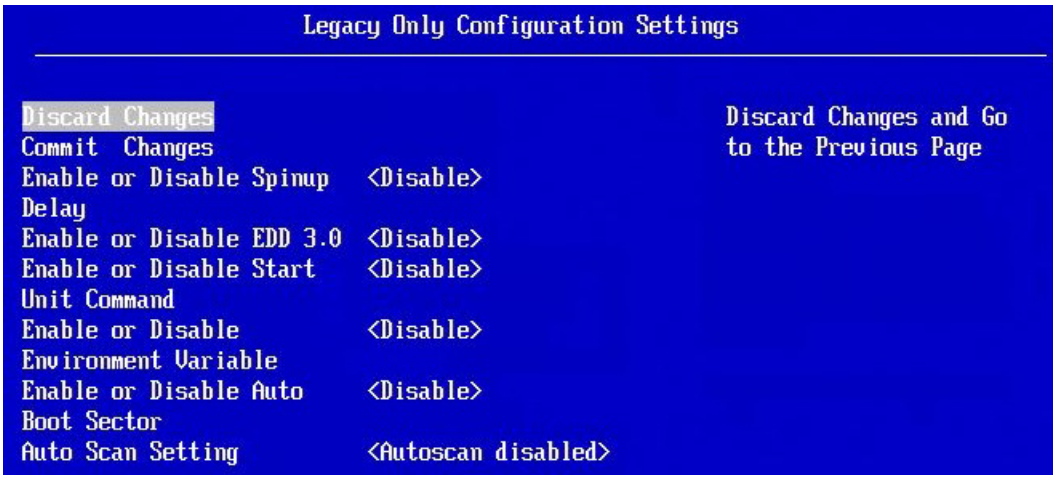

Figure 13-20 Legacy Only Configuration Settings Screen

Enabling or Disabling the Spinup Delay

This option allows you to enable or disable the disk spinup delay. The factory default setting is disabled.

If at least one boot device has been defined, and the spinup delay is enabled, the boot BIOS searches for the first available boot device.

- If a boot device is present, the boot BIOS boots from it immediately.
- If a boot device is not ready, the boot BIOS waits for the spinup delay and, for up to three additional minutes, continues the boot scanning algorithm to find another multi-boot device.

If boot devices have not been defined and auto scan is enabled, then the boot BIOS waits for five minutes before scanning for devices.

- In an attached fabric, the boot BIOS attempts to boot from the first target found in the NameServer data.

To enable or disable the spinup delay:

1. On the Legacy Only Configuration Settings screen (Figure 13-20 on page 212), select **Enable or Disable Spinup Delay** and press **<Enter>**. A pop-up menu is displayed.
2. Select **Enable** or **Disable** and press **<Enter>**.
3. Select **Commit Changes** and press **<Enter>** to save the changes and return to the Legacy Only Configuration Settings screen.

Enabling or Disabling EDD 3.0

EDD 3.0 provides additional data to the operating system boot loader during an INT-13h function 48h call (get device parameters). This information includes the path to the boot device and the disk size. The default setting for EDD 3.0 is enabled. If EDD 3.0 is disabled, the setting reverts to EDD 2.1.

To enable or disable EDD 3.0:

1. On the Legacy Only Configuration Settings screen (Figure 13-20 on page 212), select **Enable or Disable EDD 3.0** and press **<Enter>**. A pop-up menu is displayed.
2. Select **Enable** or **Disable** and press **<Enter>**.
3. Select **Commit Changes** and press **<Enter>** to save the changes and return to the Legacy Only Configuration Settings screen.

Enabling or Disabling the Start Unit Command

You must know the specific LUN to issue the SCSI start unit command. The default setting is disabled.

To enable or disable the start unit command:

1. On the Legacy Only Configuration Settings screen (Figure 13-20 on page 212), select **Enable or Disable Start Unit Command** and press **<Enter>**. A pop-up menu is displayed.
2. Select **Enable** or **Disable** and press **<Enter>**.
3. Select **Commit Changes** and press **<Enter>** to save the changes and return to the Legacy Only Configuration Settings screen.

Enabling or Disabling the Environment Variable

Sets the boot adapter order if the system supports the environment variable. The default setting is disabled.

To enable or disable the environment variable:

1. On the Legacy Only Configuration Settings screen (Figure 13-20 on page 212), select **Enable or Disable Environment Variable** and press **<Enter>**. A pop-up menu is displayed.
2. Select **Enable** or **Disable** and press **<Enter>**.
3. Select **Commit Changes** and press **<Enter>** to save the changes and return to the Legacy Only Configuration Settings screen.

Enabling or Disabling Auto Boot Sector

This option automatically defines the boot sector of the target disk for the migration boot process, which applies to HP MSA1000 arrays only. If there is no partition on the target, the default boot sector format is 63 sectors. The default setting is disabled.

To enable or disable the auto boot sector format:

1. On the Legacy Only Configuration Settings screen (Figure 13-20 on page 212), select **Enable or Disable Auto Boot Sector** and press **<Enter>**. A pop-up menu is displayed.
2. Select **Enable** or **Disable** and press **<Enter>**.
3. Select **Commit Changes** and press **<Enter>** to save the changes and return to the Legacy Only Configuration Settings screen.

Configuring the Auto Scan Setting

This option allows you to set auto scan. Auto scan is available only if none of the eight boot entries is configured. The factory default is disabled. If there is more than one adapter with the same PCI Bus number in the system, and each has a boot drive attached, the first PCI-scanned adapter is the boot adapter.

This option allows you to enable or disable the auto scan feature. Auto scan is available only when all eight boot entries are unused (empty). The factory default for auto scan is disabled. Auto scan allows you to boot from the first boot device found in the FC fabric with the following options:

- Autoscan disabled – default
- Any first device – the first adapter scans the fabric and the first disk discovered becomes the attempted boot device
- First LUN 0 device – the first device discovered with LUN 0
- First NOT LUN 0 device – the first device discovered with a LUN other than 0

To configure auto scan:

1. On the Legacy Only Configuration Settings screen (Figure 13-20 on page 212), select **Auto Scan Setting** and press **<Enter>**. A pop-up menu is displayed.
2. Select the appropriate auto scan option and press **<Enter>**.
3. Select **Commit Changes** and press **<Enter>** to save the changes and return to the Legacy Only Configuration Settings screen.

14. Troubleshooting

This section provides troubleshooting information for the supported networking protocols.

Troubleshooting for the NIC Protocol

This section provides troubleshooting information for the PXESelect utility.

Issues During the PXE Boot Process

Situation: If any of the following occur during the boot process:

- The PXE boot ROM sends a DHCP request extended with PXE specific options, but the request is not received.
- The DHCP responses do not contain the DHCP options (DHCPOFFERs) that include the NBP filename and boot server lists.
- The PXE client attempts to download the specified NBP over TFTP from one of the specified boot servers, but fails.
- The PXE client does not execute the downloaded NBP.

Outcome: If any of these issues occur, the boot process continues using the next available device in the boot sequence.

PXE Error Codes

Table 14-1 PXE Error Codes

Error Codes	Possible Reason	Comment/Solution
Init Error Codes		
PXE-E01: PCI Vendor and Device IDs do not match!	The PCI BIOS passes Bus/Device/Function numbers in AX register when it initializes the OptionROM. If the vendor ID & device ID did not match the vendor ID and the device ID in the device's PCI configuration space, with the UNDI device PCI structure defined in UNDI driver initialization code, this error is displayed.	This message should never be seen in the production level BIOS.
PXE-E04: Error reading PCI Configuration space	Any of the PCI BIOS INT 1Ah calls to read the PCI configuration space failed.	This should not happen with any production level motherboard BIOS.

Table 14-1 PXE Error Codes (Continued)

Error Codes	Possible Reason	Comment/Solution
PXE-E07: PXE BIOS calls not supported.	The PCI system BIOS does not support INT 1Ah services.	This should not happen with any PCI BIOS as all PCI BIOS must support these services.
ARP/TFTP Error Codes		
PXE-E11:ARP timeout	An ARP request is tried four times and the client did not receive an ARP reply.	Check the DHCP server settings. If you are connected through a switch, also check the switch settings.
PXE-E32: TFTP Open timeout.	A DHCP address and boot file name has been obtained and attempts to download the file name from a remote server.	• Check that the TFTP is configured properly. • Check that the filename is properly placed in the tftpboot directory. • Check that the PXE server is configured for TFTP not MTFTP.
PXE-E35: TFTP read timeout.	A TFTP server is not able to receive the next packet.	Check that the hardware and TFTP server are functioning properly.
PXE-E36: Error received from TFTP server.	A TFTP server sends an error packet.	Check the TFTP server settings and boot file settings.
PXE-E38: TFTP cannot open connection.	A TFTP client is not able to open a TFTP connection with the TFTP server.	Check that the correct boot file is copied into the default TFTP boot path.
PXE-E3B: TFTP error-File not found	A requested boot file is not found on TFTP server.	Check that the correct boot file is copied into the default TFTP boot path.
PXE-E3C: TFTP error - Access violation.	The TFTP server does not have enough access rights to open or read the file.	Check the TFTP server's file permissions.
PXE-E3F: TFTP packet size is invalid	TFTP packet received is larger than 1456 bytes.	Check the MTU on the Server side NIC interface.
Boot/DHCP Error Codes		
PXE-E51: No DHCP or Proxy DHCP offers were received.	The client did not receive any valid DHCP, BOOTP, or Proxy DHCP offers.	Check that the bootfile name is configured correctly for PXE Clients in the DHCP setup.
PXE-E52: Proxy DHCP offers were received. No DHCP offers were received.	The client did receive at least one valid proxyDHCP offer, but did not receive any valid DHCP or BOOTP offers.	Check that the DHCP server and PXE server are configured properly.
PXE-E53: No boot filename received.	The client did receive a valid BOOTP/DHCP offer, but does not have a boot file name to download in the DHCP offer.	Check that the bootfile name is configured correctly for PXEClients in the DHCP setup.

Table 14-1 PXE Error Codes (Continued)

Error Codes	Possible Reason	Comment/Solution
PXE-E55: Proxy DHCP service did not reply to request on port 4011.	The client issued a proxyDHCP request to the DHCP server on port 4011 but did not receive a reply.	Check that the DHCP server and TFTP server are properly configured on different servers. This issue may happen only if both are configured on separate servers.
UNDI Error Codes		
PXE-E60: Invalid UNDI API function number	The underlying UNDI drivers do not support the UNDI API sent from BaseCode/NBP.	Check with the hardware vendor.
PXE-E61: Media test failed, check cable.	No physical link exists on the PXE client port on which the boot is attempted.	Check the cables on the NIC interface.
PXE-E63: Error while initializing the NIC.	An issue in initializing the hardware exists as part of the UNDI_Initialize API.	Check with the hardware vendor.
BaseCode/UNDI Loader Error Codes		
PXE-EC1: BaseCode ROM ID structure was not found.	The UNDI boot module can not find the BaseCode ROM ID structure. This can be caused by a corrupted BaseCode ROM image.	
PXE-EC3: BaseCode ROM ID structure is invalid.	The BaseCode ROM ID structure is invalid. This can be caused by a corrupted BaseCode image in ROM.	
PXE-EC4: UNDI ROM ID structure was not found.	The BaseCode loader module could not locate the UNDI ROM ID structure. The UNDI ROM image is probably corrupted.	
PXE-EC5: UNDI ROM ID structure is invalid.	The UNDI ROM image is probably corrupted.	
PXE-EC8:!PXE structure was not found in UNDI driver code segment.	The UNDI ROM image is probably corrupted.	
Bootstrap and Discovery Error Codes		
PXE-E74: Bad or missing PXE menu and /or prompt information	PXE tags were detected but the boot menu and/or boot prompt were not found or were invalid.	
PXE-E77: Bad or missing discovery server list.	Two possible reasons. One is that Multicast and Broadcast discovery are both disabled. The other is that Multicast and Broadcast are enabled, but the server list tag is not found or is invalid.	

Table 14-1 PXE Error Codes (Continued)

Error Codes	Possible Reason	Comment/Solution
PXE-E78: Could not locate boot server.		
PXE-E79: NBP is too big to fit in free base memory.	The NBP file size is larger than the free base memory.	Check the NBP file size.
Miscellaneous Error Codes		
PXE-EA0: Network boot cancelled by keystroke	Pressing **<Ctrl>** and **<C>** during DHCP discovery.	

Troubleshooting for the iSCSI Protocol

This section includes troubleshooting information for the iSCSISelect utility.

Table 14-2 Troubleshooting the iSCSISelect Utility

Issue	Answer/Solution
iSCSI BIOS banner is not displayed during system post.	• Check the motherboard BIOS configuration and make sure that the Option ROM is enabled and is set for the PCIe slot into which the adapter is inserted. • If the Option ROM is enabled and is set for the PCIe slot into which the adapter is inserted and the issue persists, erase the adapter configuration. For more information, see “Erasing the Current Configuration” on page 112.
Unable to ping iSCSI target IP address	• Check cable connections and make sure they are securely connected at both ends. Make sure the link light is ON at both ends of the cable. • Verify that you have assigned a valid IP address with the correct subnet mask to the interfaces that are connected to the network. • Check for duplicate IP addresses. • Make sure you are connected to the correct port. • If the IP address is coming from DHCP, check that the DHCP server is up and available. • Is the target on a different subnet? Check the default gateway and make sure that the IP addresses of both the default gateway and the remote host are correct. • Check link status under the Network Configuration screen. If you try changing the initiator link status, you can back out one screen then go back to the Network Configuration screen to see a view of the current link status.

Table 14-2 Troubleshooting the iSCSISelect Utility (Continued)

Issue	Answer/Solution
Login to iSCSI target fails or login succeeds, but no LUNs are available.	• Check initiator IQN name and target IQN name. Verify that they are properly specified. • Check target's ACL settings (if any) to verify that the initiator's IQN name is listed and can be recognized. • Make sure that the target login parameters are compatible with the initiator's. • If this checklist confirms that initiator and target are configured correctly and the issue persists, erase the adapter configuration. For more information, see “Erasing the Current Configuration” on page 112.
Login to iSCSI target is successful, but iSCSI I/O causes the system to hang or freeze.	Check the jumbo frame settings on the iSCSI target. If enabled, change the frame size to 1514 and retry. This isolates any issues in the network related to jumbo frames. Jumbo frames, if supported by the entire network, provide increased performance. **Note:** OneConnect adapters support jumbo frames.
Unable to boot from the iSCSI target.	• Check the target setup. Check the target ACL to verify that the initiator's iSCSI name is listed and can be recognized. • Check the initiator name and make sure it is correct. • If applicable, verify that you have selected the iSCSI LUN as the boot LUN in the system BIOS setting. • Check the system BIOS for boot device priority order. Make sure that the boot device is at the top. If using DHCP: • If Boot Support is not enabled, enable it on the iSCSI Initiator screen. (For more information, see chapter 9., “Configuring and Managing the iSCSI Initiator with the iSCSISelect Utility,” on page 101.) If DHCP boot support is enabled, check the DHCP setup and also verify that you have added the root path to the DHCP server. For more information, see “Setting Up a Basic iSCSI Boot Configuration” on page 98. • If this checklist confirms that the initiator and target are configured correctly and the issue persists, erase the adapter configuration. For more information, see “Erasing the Current Configuration” on page 112.
BIOS post shows “BIOS Not Installed” message.	• If you *have not* configured an iSCSI boot target, this is proper normal behavior. • If you *have* configured an iSCSI boot target and the BIOS cannot find a bootable LUN, then refer to the solutions provided in the issue *Unable to boot from the iSCSI target*.

Table 14-2 Troubleshooting the iSCSISelect Utility (Continued)

Issue	Answer/Solution
If solutions for issues 1-3 and 5-6 all fail.	Use the iSCSISelect utility to erase the adapter configuration. To clear the adapter configuration: 1) From the Controller Configuration screen, select **Erase Configuration** and press **<Enter>**. 2) A message is displayed asking if you want to erase the current configuration. Press **<Y>**. 3) You are cautioned that the operation removes any existing configuration permanently. Press **<Y>**. **Note:** If you have multiple adapters, you must erase the configuration of each adapter separately. For more information, see “Erasing the Current Configuration” on page 112. After you erase the adapter configuration, reboot the system and then reconfigure the adapter.

You receive this POST error message:
`Initiator iSCSI Name mismatch, Please use iSCSISelect to set a single name for all controllers.`
`Press <Ctrl><S> to enter iSCSISelect. (Reboot required)`
	In the iSCSI BIOS, the iSCSI initiator name can be different if there is more than one Emulex adapter in the system. If the iSCSI initiator name is different on multiple adapters, you receive a POST error message indicating an iSCSI name mismatch. You must enter the iSCSISelect utility and save a new initiator name on the first iSCSISelect utility menu screen so that the iSCSI initiator name on all adapters match. All logins from the multiple adapters use the new name.

You receive any of the following POST error messages or warnings:
`Redboot Initialization failed...`
`Firmware Load failed...`
`DDR config failed...`
`DDR callibrate failed...`
`DDR test failed...`
`SEEPROM checksum failed...`
`Secondary firmware image loaded...`
	These POST messages indicate that you must reload the adapter firmware using OneCommand Manager or one of the Emulex online or offline utilities. If the errors persist, contact Technical Support.

You receive this POST error message: `Firmware halted. This firmware does not support this controller.`	The firmware loaded on this adapter is not supported. Load the appropriate firmware for the adapter.

Troubleshooting for the FCoE Protocol

Table 14-3 Troubleshooting the FCoE Protocol

Issue	Answer/Solution
Cisco Nexus switch configuration situations: • Windows creates the NTFS partition properly, but then reports that "The hard disk containing the partition or free space you chose has a LUN greater than 0. Setup cannot continue". (Dell 1850 server). • Windows reboots successfully, but then gets stuck during the GUI portion of the installation right from the beginning. (HP DL385G2 server).	Ensure that the FCoE switch ports are configured correctly for the adapter's FCoE settings.

Appendix A. Configuring iSCSI through a DHCP Server using Vendor-Specific Option 43

An iSCSI initiator requires the following parameters to boot from a target:

- Its IP address
- Its unique node name
- The boot iSCSI target's IP address
- The boot target's name. If not available, this may be discovered using the iSCSI discovery protocol.
- The target's non-default TCP port number (if applicable)
- Header and data digest settings to be used with the target
- Authentication parameters, if applicable

If your boot BIOS allows it, you can configure all of the above parameters from a centrally configured DHCP server using vendor-specific option 43. This appendix documents this method of configuration. For this method, the initiator must be configured (using non-DHCP means) with the appropriate DHCP vendor ID. The method and format for specifying the vendor ID is outside the scope of this document. The initiator offers this Vendor ID to the DHCP server to retrieve data in the format described in the following sections.

Two other configuration methods are not documented in this appendix:

- Manual configuration using iSCSISelect or SMCLP/MILI
- Pre-boot configuration using CLP /BIOS 3.0

Format of Vendor-Specific Option 43

The format for vendor-specific option 43 is as follows:

```
iscsi:<ipaddress>:<protocol>:<iscsi port number>:<lun>:<target name>
```

Fields enclosed in angular brackets (including the angular brackets) should be replaced with their corresponding values. All fields are case insensitive.

See the example at the end of this document.

Description of Parameters

<ipaddress>

Replace this parameter with a valid IPv4 address in dotted decimal notation. This is a mandatory field.

<protocol>

Replace this parameter with a decimal number indicating the TCP port. The default TCP port is 3260.

<iscsi port number>

Replace this parameter with a decimal number ranging from 1 to 65535 (inclusive). It is an optional field.

<lun>

This parameter is a hexadecimal representation of logical unit number of the boot device. It is an optional field. If not provided, LUN 0 is assumed to be the boot LUN. It is an 8-byte number which must be specified as a hexadecimal number consisting of 16 digits, with an appropriate number of 0's padded to the left, if required.

<target name>

Replace this parameter with a valid iSCSI target 'iqn' name of up to 223 characters. This is a mandatory field.

Example

```
iscsi:010.010.010.001:0:3260:0:iqn.1992-08.com.netap:sn.151729740
```

The above example specifies the following:

- Target IP address: 010.010.010.001
- Target protocol: 0
- Target TCP port: 3260
- Target boot LUN: 0
- Target iqn name: iqn.1992-08.com.netap:sn.151729740

Appendix B. Example for Installing and Configuring Linux or Citrix for PXE Boot and UEFIBoot

This section provides examples for installing and configuring Linux and Citrix for PXE boot and UEFIBoot.

Linux and Citrix PXE Server Remote Installation Procedure

PXE configuration requires a PXE server and the PXE client.

Setting up a PXE server requires the following configurations:

- NFS server
- TFTP server
- DHCP server
- PXE boot server

The pxelinux functionality occurs in this order:

1. The client machine boots to PXE, which requests a DHCP address.
2. The DHCP server responds with an IP address for the client machine, the address of a TFTP server, and a filename to load (pxelinux.0) from that server.
3. The client downloads pxelinux.0 from the specified TFTP server and executes it.
4. The pxelinux.0 file searches the pxelinux.cfg directory on the server for a configuration file that matches the IP address of the machine. If no matches are found, it attempts to load a file called default.
5. The configuration file loaded by pxelinux.0 has instructions on what to do next. Some of the choices include boot to local hard drive, boot to an image file (floppy image), or load vmlinuz and initrd.img.
6. The client searches for a configuration file with the IP address converted to hexadecimal (for example, 192.168.1.60 becomes C0A8013C) or the MAC address of your PXE boot client's Ethernet card with a prefix of "01". The MAC address should be separated with dashes instead of colons.

   In this example, the client looks for the following configuration file names and uses the first one it finds.

   ```
   01-00-00-C9-5B-75-A8
   C0A8013C
   C0A8013
   C0A801
   C0A80
   C0A8
   C0A
   ```

```
C0
C
default
```

7. The default file's contents should look similar to the following:

```
prompt 1
default linux
timeout 100

label linux
kernel vmlinuz
append initrd=initrd.img ramdisk_size=9216 noapic acpi=off
```

PXE Server

This section provides configuration scripts for the PXE server.

NFS Server Configuration Script

```
[root@bglinux156 ~]# mkdir /work
[root@bglinux156 ~]# mount 10.192.194.110:/work /mnt
[root@bglinux156 ~]# cd /mnt/
[root@bglinux156 ~]# cp -r rhel5564/ /work/ #copy the entire
 directory to "/work"
[root@bglinux156 ~]# cd /work/rhel5564
[root@bglinux156 ~]# cp -r images/ /tftpboot/linux-install/
[root@bglinux156 ~]# vim /etc/exports###(Add "/work *(rw,sync)")
[root@bglinux156 ~]# exportfs -a (reflect changes in NFS Server)
```

1. Restart NFS Services.

```
[root@bglinux156 ~]# /etc/rc.d/init.d/portmap restart
Stopping portmap: [ OK ]
Starting portmap: [ OK ]
[root@bglinux156 ~]# /etc/rc.d/init.d/nfslock restart
Stopping NFS locking: [ OK ]
Stopping NFS statd: [ OK ]
Starting NFS statd: [ OK ]
[root@bglinux156 ~]# /etc/rc.d/init.d/nfs restart
Shutting down NFS mountd: [ OK ]
Shutting down NFS daemon: [ OK ]
Shutting down NFS quotas: [ OK ]
Shutting down NFS services: [ OK ]
Starting NFS services: [ OK ]
Starting NFS quotas: [ OK ]
Starting NFS daemon: [ OK ]
```

```
Starting NFS mountd: [ OK ]
```

2. Check if the NFS services are running.

```
[root@bglinux156 ~]# rpcinfo -p
 program vers proto port
 100000 2 tcp 111 portmapper
 100000 2 udp 111 portmapper
 100021 1 udp 56782 nlockmgr
 100021 3 udp 56782 nlockmgr
 100021 4 udp 56782 nlockmgr
 100021 1 tcp 44855 nlockmgr
 100021 3 tcp 44855 nlockmgr
 100021 4 tcp 44855 nlockmgr
 100024 1 udp 766 status
 100024 1 tcp 769 status
 100011 1 udp 815 rquotad
 100011 2 udp 815 rquotad
 100011 1 tcp 818 rquotad
 100011 2 tcp 818 rquotad
 100003 2 udp 2049 nfs
 100003 3 udp 2049 nfs
 100003 4 udp 2049 nfs
 100003 2 tcp 2049 nfs
 100003 3 tcp 2049 nfs
 100003 4 tcp 2049 nfs
 100005 1 udp 828 mountd
 100005 1 tcp 831 mountd
 100005 2 udp 828 mountd
 100005 2 tcp 831 mountd
 100005 3 udp 828 mountd
```

TFTP Server Setup

```
[root@bglinux156 ~]# vi /etc/xinetd.d/tftp

service tftp
{
 socket_type = dgram
 protocol = udp
 wait = yes
 user = root
 server = /usr/sbin/in.tftpd
 server_args = -s /tftpboot/linux-install #This line specifies
 #path where the pxe boot searches for
```

```
 #the images
 disable = no #convert this line from yes to no
 per_source = 11
 cps = 100 2
 flags = IPv4
}

[root@bglinux156 ~]# /sbin/chkconfig --level 345 xinetd on
[root@bglinux156 ~]# /sbin/chkconfig --level 345 tftp on
[root@bglinux156 ~]# service xinetd restart
```

DHCP Server Configuration

1. Install the following RPMs in the server if not installed:

```
[root@bglinux156 ~]# rpm -qa | grep dhcp
dhcpv6-client-1.0.10-18.el5
dhcp-devel-3.0.5-23.el5
dhcp-3.0.5-23.el5
```

2. Make the following entry in /etc/dhcpd.conf file:

```
#
# DHCP Server Configuration file.
# see /usr/share/doc/dhcp*/dhcpd.conf.sample
#
ddns-update-style interim;
 subnet 192.168.1.0 netmask 255.255.255.0 {
 range 192.168.1.50 192.168.1.90;
 default-lease-time 3600;
 max-lease-time 4800;
 option subnet-mask 255.255.255.0;
 option domain-name "pxe_text";
 option time-offset -8;
 }

host bglinux45{
 next-server 192.168.1.1;
 hardware ethernet 00:00:C9:5B:75:A8;
 fixed-address 192.168.1.60;
 option host-name "linux-test";

  filename "pxelinux.0";
 }
###This sets up a DNS server that will assign IP Address 192.168.1.60
###to the client machine that has MAC Address "00:00:C9:5B:75:A8"
###assigned to a PXE capable NIC
###The only thing that needs to be changed in the above, is the MAC
###Address to match that of the NIC in the client box
###The IP address that follows the next-server option should be the IP
```

```
###address of the tftp server

[root@bglinux156 ~]# service dhcpd restart
Shutting down dhcpd: [ OK ]
Starting dhcpd: [ OK ]
```

PXE Boot Server Configuration

```
[root@bglinux156 ~]# rpm -qa | grep system-config-netboot
system-config-netboot-cmd-0.1.45.1-1.el5
system-config-netboot-0.1.45.1-1.el5
```

Copying Files to the TFTP Server with the Graphical Version of the Network Booting Tool

Copy the necessary files to start the installation to the TFTP server to enable them to be found when the client requests them. Run the Network Booting Tool on the NFS, FTP, or HTTP server. A separate PXE server is not necessary.

To use the graphical version of the Network Booting Tool, you must be running the X Window System, have root privileges, and have the redhat-config-netboot .rpm package installed.

To start the Network Booting Tool from the desktop, do one of the following:

- Go to the Main Menu Button (on the Panel) and select **System Settings >Server Settings >Network Booting Service.**

  -or-

- Type the command system-config-netboot at a shell prompt. (For example, in an XTerm or a GNOME terminal.)

  Note: If you are starting the Network Booting Tool for the first time, select **Network Install from the First Time Druid**.

Copy the files necessary to start the installation to the TFTP server.

1. Select **Configure > Network Installation** from the pull-down menu (Figure B-1 on page 229).

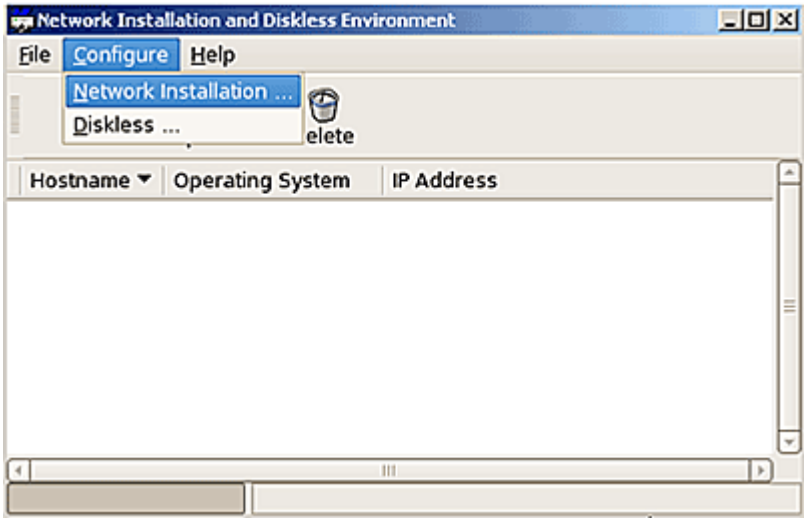

Figure B-1 Network Installation and Diskless Environment Window

The Configure Network Installations window (Figure B-2 on page 229) is displayed.

2. Click **Add**.

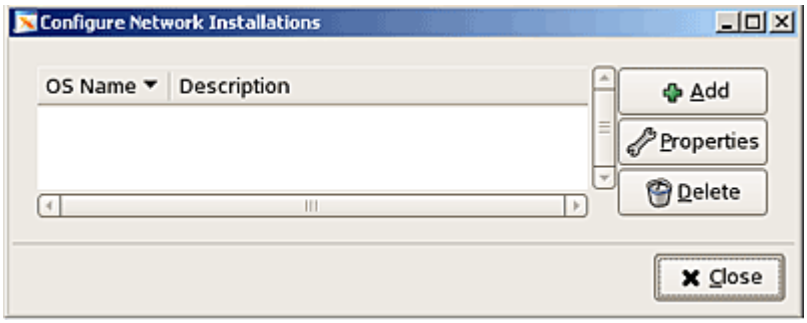

Figure B-2 Configure Network Installations Window

The Network Installation Dialog window (Figure B-3 on page 230) is displayed.

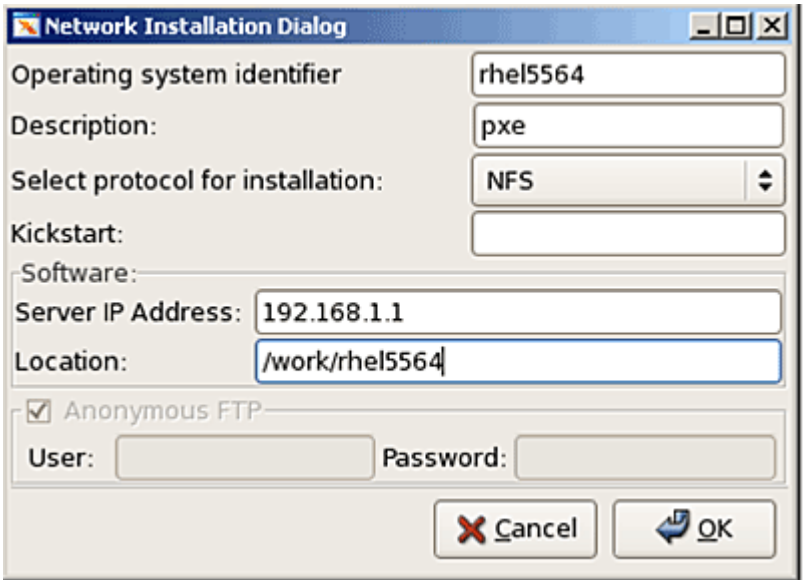

Figure B-3 Network Installation Dialog Window

3. Enter the operating system identifier and description.
4. Select **pxe** as the protocol for installation.
5. Enter the IP address of the TFTP server (as set up in the DHCP server configuration) in the server IP address field.
6. Enter a directory location for the server.

   The Network Installation and Diskless Environment window (Figure B-4 on page 230) shows the IP address of the TFTP server.

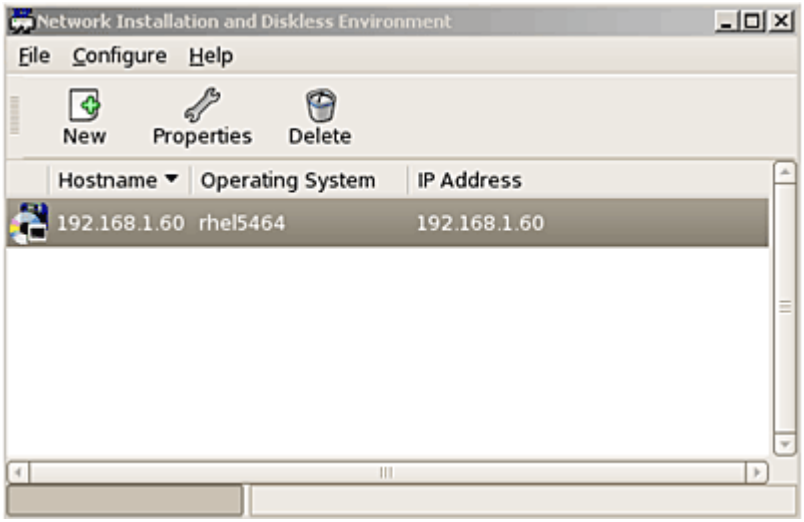

Figure B-4 Network Installation and Diskless Environment Window with IP Address

Configuring the Host

To configure the host:

1. Double-click the IP address row in the Network Installation and Diskless Environment window (Figure B-4 on page 230). An edit window (Figure B-5 on page 231) is displayed.

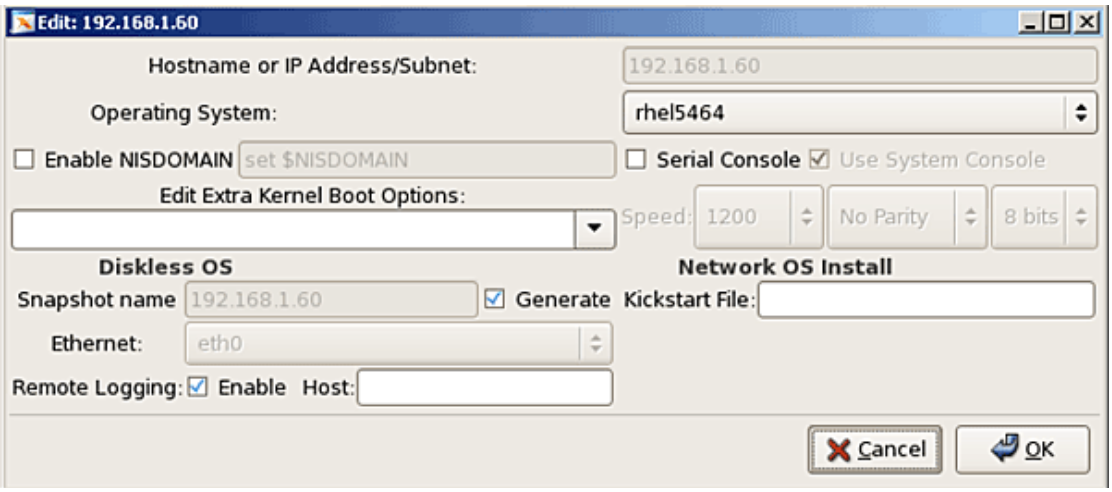

Figure B-5 Edit Window

2. In the Hostname or IP Address/Subnet field, enter the IP address, fully qualified hostname, or a subnet of systems that should be allowed to connect to the PXE server for installations. In Figure B-5 on page 231, the Hostname or IP Address/Subnet field is the IP address of the client machine.
3. In the case of a multi-boot environment, select an operating system preference.
4. Select the operating system identifier to install on this client. The list is populated from the network install instances created from the Network Installation dialog box.
5. If you use a serial console, check the **Serial Console** check box.
6. Specify the location of a kickstart file, such as http://server.example.com/kickstart/ks.cfg. This file can be created with the Kickstart Configuration.

   Note: Ignore the Snapshot name and Ethernet options. They are used for diskless environments only.

7. Click **OK**. This closes the window and creates configuration files within:

   `/tftpboot/linux-install and /tftpboot/linux-install/pxelinux.cfg`

8. Go to /tftpboot/pxelinux.cfg and open the file C0A8013C. The C0A8013C file is created when you assign the client IP using “system-config- netboot”. This is the hexadecimal address of the IP assigned to the client NIC. It is 192.168.1.60 in the example in Figure B-4 on page 230.

Enabling the PXE Client with a PXE-enabled Adapter

The PXE client must have a PXE-enabled adapter.

1. Power on the PXE client.
2. Press **<F12>** to enable network boot (Figure B-6 on page 232). Pressing **<F12>** accesses the DHCP server IP and the Boot Linux image.

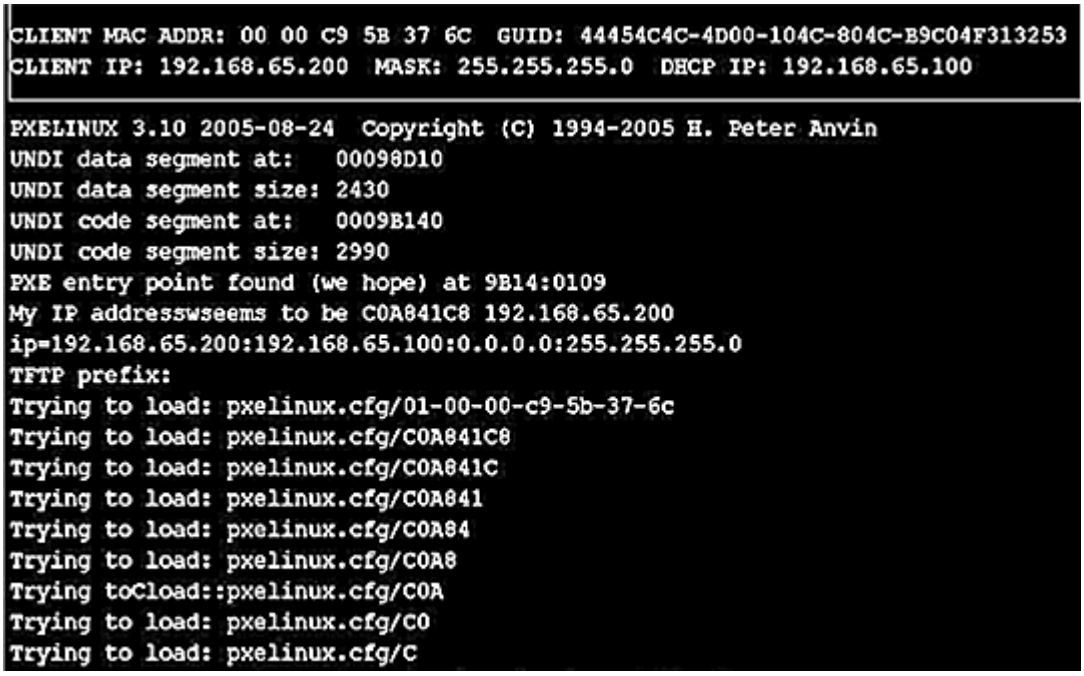
CLIENT MAC ADDR: 00 00 C9 5B 37 6C GUID: 44454C4C-4D00-104C-804C-B9C04F313253
CLIENT IP: 192.168.65.200 MASK: 255.255.255.0 DHCP IP: 192.168.65.100
PXELINUX 3.10 2005-08-24 Copyright (C) 1994-2005 H. Peter Anvin
UNDI data segment at: 00098D10
UNDI data segment size: 2430
UNDI code segment at: 0009B140
UNDI code segment size: 2990
PXE entry point found (we hope) at 9B14:0109
My IP addresswseems to be C0A841C8 192.168.65.200
ip=192.168.65.200:192.168.65.100:0.0.0.0:255.255.255.0
TFTP prefix:
Trying to load: pxelinux.cfg/01-00-00-c9-5b-37-6c
Trying to load: pxelinux.cfg/C0A841C8
Trying to load: pxelinux.cfg/C0A841C
Trying to load: pxelinux.cfg/C0A841
Trying to load: pxelinux.cfg/C0A84
Trying to load: pxelinux.cfg/C0A8
Trying toCload::pxelinux.cfg/C0A
Trying to load: pxelinux.cfg/C0
Trying to load: pxelinux.cfg/C

Figure B-6 Enabling Network Boot Screen

Appendix C. Examples for Configuring and Booting UEFI NIC

This section provides examples for configuring and boot UEFI NIC.

UEFI NIC Server Configuration Script for SLES11 SPx

```
[root@orleansrhel5564 ~]# ls /root/sles11sp164/
SLES-11-SP1-DVD-x86_64-GM-DVD1.iso
[root@orleansrhel5564 ~]# mkdir test1
[root@orleansrhel5564 ~]# mkdir test2
[root@orleansrhel5564 ~]# mount -o loop
sles11sp164/SLES-11-SP1-DVD-x86_64-GM-DVD1.iso test1
[root@orleansrhel5564 ~]# ls test1
ARCHIVES.gz COPYING.degpg-pubkey-3d25d3d9-36e12d04.asc media.1
boot COPYRIGHT gpg-pubkey-7e2e3b05-4be037ca.asc NEWS
ChangeLog COPYRIGHT.degpg-pubkey-9c800aca-4be01999.asc pubring.gpg
content directory.yast gpg-pubkey-a1912208-446a0899.asc README
content.ascdocu gpg-pubkey-b37b98a9-4be01a1a.asc suse
content.keygpg-pubkey-0dfb3188-41ed929b.ascINDEX.gz
control.xmgpg-pubkey-1d061a62-4bd70bfa.asclicense.tar.gz
COPYING gpg-pubkey-307e3d54-4be01a65.ascls-lR.gz
[root@orleansrhel5564 ~]# mount -o loop test1/boot/x86_64/efi test2
[root@orleansrhel5564 ~]# ls -lar test2
total 28
-rwxr-xr-x 1 root root 48 May 20 2010 .packages.boot-efi
drwxr-xr-x 3 root root 2048 May 20 2010 efi
drwxr-x--- 20 root root 4096 Jan 5 14:04 ..
drwxr-xr-x 3 root root 16384 Jan 1 1970 .
[root@orleansrhel5564 ~]# ls -lar test2/efi/boot/
bootx64.efi elilo.conf initrd linux
[root@orleansrhel5564 ~]# ls -lar test2/efi/boot/
total 26838
-rwxr-xr-x 1 root root 3231872 May 20 2010 linux
-rwxr-xr-x 1 root root 23999623 May 20 2010 initrd
-rwxr-xr-x 1 root root 512 May 20 2010 elilo.conf
-rwxr-xr-x 1 root root 241318 May 20 2010 bootx64.efi
drwxr-xr-x 3 root root 2048 May 20 2010 ..
drwxr-xr-x 2 root root 2048 May 20 2010 .
[root@orleansrhel5564 ~]# cp test2/boot/efi/* /tftpboot/linux-install/
```

NFS Server Configuration Script

```
[root@bglinux156 ~]# /etc/rc.d/init.d/portmap restart
Stopping portmap: [ OK ]
Starting portmap: [ OK ]
[root@bglinux156 ~]# /etc/rc.d/init.d/nfslock restart
Stopping NFS locking: [ OK ]
Stopping NFS statd: [ OK ]
Starting NFS statd: [ OK ]
[root@bglinux156 ~]# /etc/rc.d/init.d/nfs restart
Shutting down NFS mountd: [ OK ]
Shutting down NFS daemon: [ OK ]
Shutting down NFS quotas: [ OK ]
Shutting down NFS services: [ OK ]
Starting NFS services:[ OK ]
Starting NFS quotas: [ OK ]
Starting NFS daemon: [ OK ]
Starting NFS mountd: [ OK ]
#### Check if the NFS services are running:
[root@bglinux156 ~]# rpcinfo -p
 program vers proto port
 100000 2 tcp 111 portmapper
 100000 2 udp 111 portmapper
 100021 1 udp 56782 nlockmgr
 100021 3 udp 56782 nlockmgr
 100021 4 udp 56782 nlockmgr
 100021 1 tcp 44855 nlockmgr
 100021 3 tcp 44855 nlockmgr
 100021 4 tcp 44855 nlockmgr
 100024 1 udp 766 status
 100024 1 tcp 769 status
 100011 1 udp 815 rquotad
 100011 2 udp 815 rquotad
 100011 1 tcp 818 rquotad
 100011 2 tcp 818 rquotad
 100003 2 udp 2049 nfs
 100003 3 udp 2049 nfs
 100003 4 udp 2049 nfs
 100003 2 tcp 2049 nfs
 100003 3 tcp 2049 nfs
 100003 4 tcp 2049 nfs
 100005 1 udp 828 mountd
```

```
100005 1 tcp 831 mountd
100005 2 udp 828 mountd
100005 2 tcp 831 mountd
100005 3 udp 828 mountd
```

DHCP Server Configuration

```
[root@orleansrhel5564 ~]# cat /etc/dhcpd.conf
```

1. Install the following RPMs in the server if not installed:

```
[root@bglinux156 ~]# rpm -qa | grep dhcp
dhcpv6-client-1.0.10-18.el5
dhcp-devel-3.0.5-23.el5
dhcp-3.0.5-23.el5
```

2. Make the following entry in /etc/dhcpd.conf file:

```
#
# DHCP Server Configuration file.
#      see /usr/share/doc/dhcp*/dhcpd.conf.sample
#

ddns-update-style interim;
#ignore client-updates;
subnet 192.168.47.0 netmask 255.255.255.0 {
range 192.168.47.50 192.168.47.100;
default-lease-time 3600;
max-lease-time-4800;
option subnet-mask 255.255.255.0;
option domain-name "pxe_test";
option time-offset -8; # Eastern Standard Time
}

# we want the nameserver to appear at a fixed address
 host orleansrhel5564 {
 next-server 192.168.47.1;#IP of the NFS Server
 hardware ethernet 00:00:c9:5b:a5:26;#mac address of
 #the client
#machine

 fixed-address 192.168.47.60; #IP assigned to the
 #client machine
 option host-name "linux-test";
 filename "bootx64.efi"; #Used for UEFI boot
 }

###This sets up a DNS server that will assign IP Address 192.168.47.60
###to the client machine that has MAC Address "00:00:c9:5b:a5:26"
###assigned to a PXE(UEFI) capable NIC
###The only thing that needs to be changed in the above, is the MAC
```

```
###Address to match that of the NIC in the client box
###The IP address that follows the next-server option should be the IP
###address of the tftp server
[root@bglinux156 ~]# service dhcpd restart
Shutting down dhcpd: [ OK ]
Starting dhcpd: [ OK ]
```

TFTP Server Setup

```
[root@orleansrhel5564 ~]# cat /etc/xinetd.d/tftp
service tftp
{
 disable = no
 socket_type = dgram
 protocol = udp
 wait= yes
 user = root
 server = /usr/sbin/in.tftpd
 server_args = -s /tftpboot/linux-install
 per_source = 11
 cps = 100 2
 flags = IPv4
```

UEFI NIC Server Configuration Script for RHEL 6.x

This section provides UEFI NIC server configuration scripts to use on RHEL 6.x operating systems.

Setup Information

PXE client server: Dell R710 with Emulex OneConnect CNA or Intel X520 card (Test System to do UEFI PXE boot)

PXE server: HP running RHEL 5.5 64 bit

NFS Configuration

```
[root@orleans ~]# mkdir /work
[root@orleans ~]# mount 10.192.194.110:/work /mnt   #### Mounting network drive
[root@orleans ~]# cd /mnt/
[root@orleans ~]# cp -r rhel6364/ /work/  #### Copying rhel6.1-64 bit os to PXE
server mechine
[root@orleans ~]# vim /etc/exports       ####(Add "/work    *(rw,sync)"
[root@orleans ~]#  exportfs -a           ####(reflect changes in NFS Server)


#### Restart NFS services
[root@orleans ~]#/etc/rc.d/init.d/portmap restart
```

```
[root@orleans ~]# /etc/rc.d/init.d/nfslock restart
[root@orleans ~]# /etc/rc.d/init.d/nfs restart


#### Check if NFS is running fine

[root@orleans ~]# rpcinfo -p

   program vers proto   port
    100000    2   tcp    111  portmapper
    100000    2   udp    111  portmapper
    100021    1   udp  56782  nlockmgr
    100021    3   udp  56782  nlockmgr
    100021    4   udp  56782  nlockmgr
    100021    1   tcp  44855  nlockmgr
    100021    3   tcp  44855  nlockmgr
    100021    4   tcp  44855  nlockmgr
    100024    1   udp    766  status
    100024    1   tcp    769  status
    100011    1   udp    815  rquotad
    100011    2   udp    815  rquotad
    100011    1   tcp    818  rquotad
    100011    2   tcp    818  rquotad
    100003    2   udp   2049  nfs
    100003    3   udp   2049  nfs
    100003    4   udp   2049  nfs
    100003    2   tcp   2049  nfs
    100003    3   tcp   2049  nfs
    100003    4   tcp   2049  nfs
    100005    1   udp    828  mountd
    100005    1   tcp    831  mountd
    100005    2   udp    828  mountd
    100005    2   tcp    831  mountd
    100005    3   udp    828  mountd
```

TFTP Configuration

```
[root@orleans ~]# vi /etc/xinted.d/tftp

# default: off
# description: The tftp server serves files using the trivial file transfer \
#       protocol.  The tftp protocol is often used to boot diskless \
#       workstations, download configuration files to network-aware printers, \
#       and to start the installation process for some operating systems.
service tftp
{
        disable                 = no
        socket_type             = dgram
        protocol                = udp
```

```
        wait                    = yes
        user                    = root
        server                  = /usr/sbin/in.tftpd
        server_args             = -s /tftpboot/linux-install
        per_source              = 11
        cps                     = 100 2
        flags                   = IPv4
}


##### Restart TFTP service

[root@orleans ~]# service xinetd restart
Stopping xinetd:                                    [  OK  ]
Starting xinetd:                                    [  OK  ]
[root@orleans ~]# chkconfig tftp on
```

PXE Configuration

```
[root@orleans ~]# cd /work/rhel6364/

[root@orleans RHEL6364]# cd images/pxeboot/

[root@orleans pxeboot]# cp -r * /tftpboot/linux-install/
#### Copy vmlinuz and initrd to TFTP root directory

[root@orleans pxeboot]# mkdir -p /root/test1

[root@orleans images]# cd /work/rhel6364/images/

[root@orleans images]# mount -o loop efiboot.img /root/test1     ###### Extract
efiboot.img to get bootx64.efi and BOOTX64.conf files

[root@orleans images]# cd /root/test1

[root@orleans test1]# cd efi/boot/

[root@orleans boot]# cp -r * /tftpboot/linux-install/   ###### Copy bootx64.efi
and BOOTX64.conf to TFTP root directory

#### Editing efidefault to the following content

[root@orleans boot]# cat /tftpboot/linux-install/efideault
default=0
timeout 10
splashimage=(nd)/splash.xpm.gz
title RHEL6364
        root (nd)
        splashimage /splash.xpm.gz
```

```
        kernel /vmlinuz keymap=us lang=en_US  method=nfs:192.168.1.1:/RHEL6364
ip=dhcp noipv6
        initrd /initrd.im
```

Configuring DHCP

```
[root@orleans ~]# cat  /etc/dhcpd.conf
#
# DHCP Server Configuration file.
#   see /usr/share/doc/dhcp*/dhcpd.conf.sample
ddns-update-style interim;
ignore client-updates;
#allow booting;
#allow bootp;
subnet 192.168.1.0 netmask 255.255.255.0 {
 range 192.168.1.50 192.168.1.90;
 default-lease-time 3600;
 max-lease-time 4800;
 option subnet-mask 255.255.255.0;
# option router 192.168.1.1;
 option domain-name "pxe_text";
# option name-server 192.168.1.20;
 option time-offset -8;
 }

host bglinux45{
  next-server 192.168.1.1;    #### IP address of PXE server interface connected
back to back to PXE client interface
  hardware ethernet 00:00:C9:BB:C7:8F;  #### MAC address of PXE client interface
  fixed-address 192.168.1.60;  #### IP address to be assigned to PXE client
interface
  option host-name "linux-test";
  filename "bootx64.efi";
 }

#### Restart DHCP service
[root@orleans ~]# service dhcpd restart
Shutting down dhcpd:                                [  OK  ]
Starting dhcpd:                                     [  OK  ]
```

Note: Reboot the system under test and boot from the PXE client interface.

Configuring the IBM HS22 Blade with e-Raptor MEZZ

To install and update the driver, follow these steps:

1. Press **<F1>** during the system boot and log into the System Configuration and Boot Management screen (Figure C-1 on page 240).

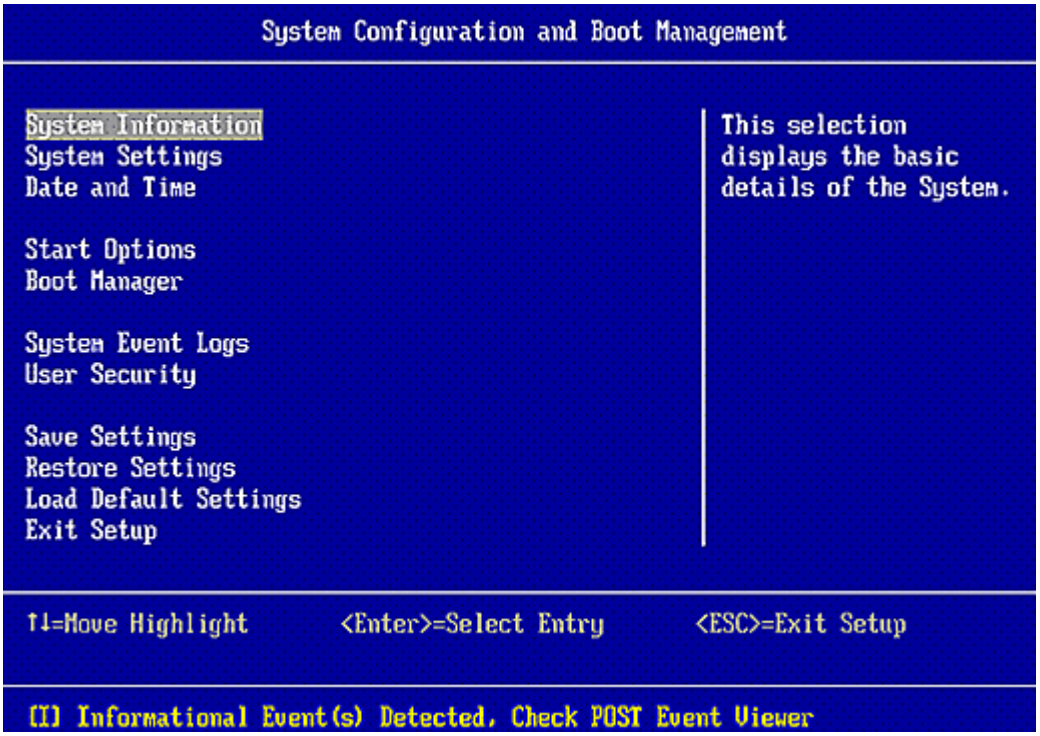

Figure C-1 System Configuration and Boot Management Screen

2. Select **Boot Manager** and press **<Enter>**. The Boot Manager screen (Figure C-2 on page 241) is displayed.

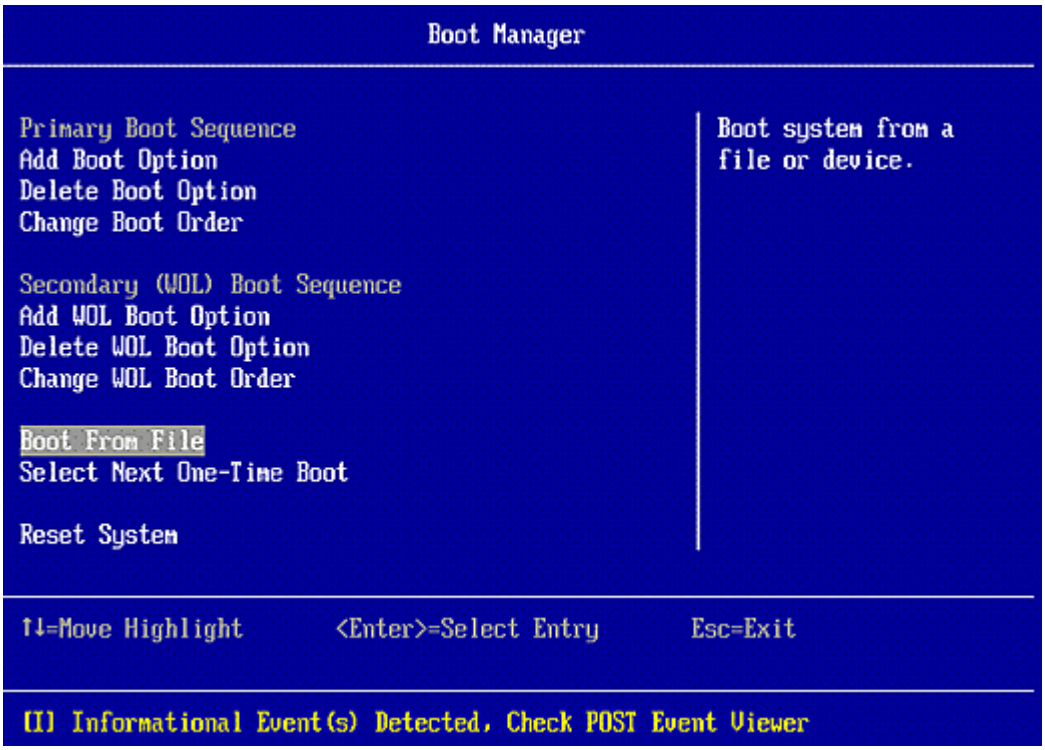

Figure C-2 Boot Manager Screen

3. Select **Boot from File** and press **<Enter>**. The File Explorer screen (Figure C-3 on page 242) is displayed.

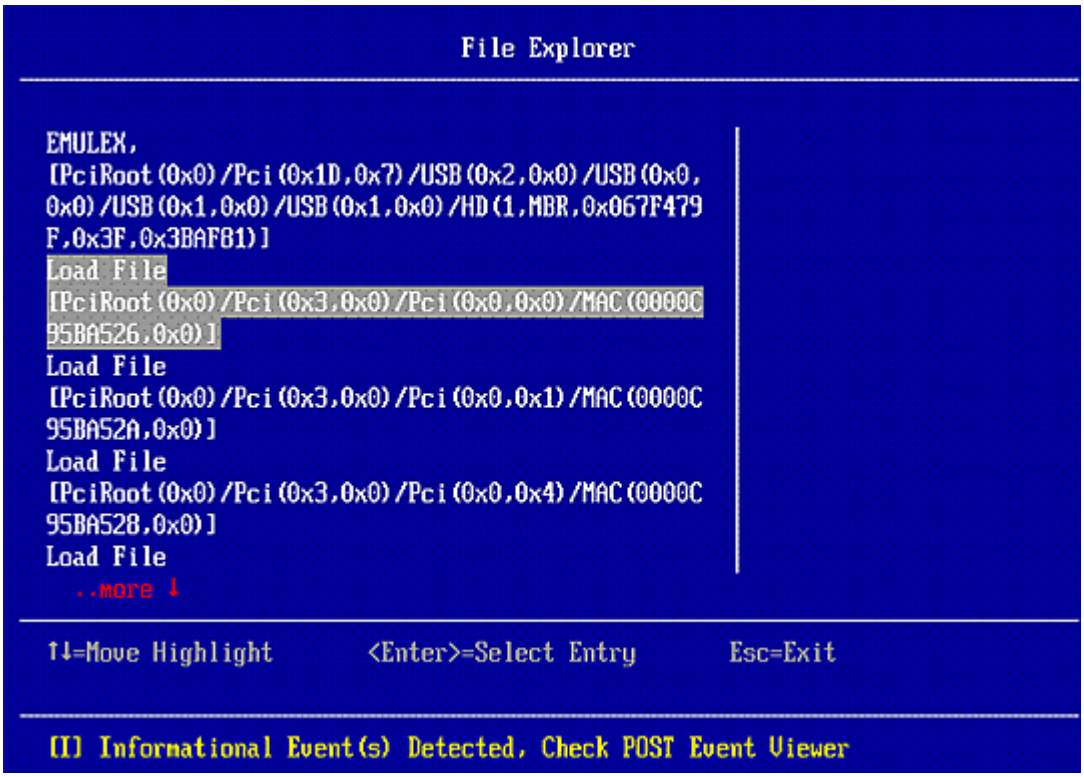

Figure C-3 File Explorer Screen

4. Select the card from which the UEFI NIC boot is to be performed. Press **<Enter>**.

   A message similar to Figure C-4 on page 242 is displayed.

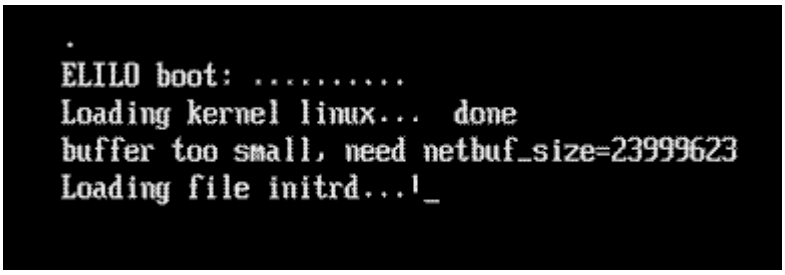

Figure C-4 ELILO Boot Message

The Language Selection menu (Figure C-5 on page 243) is displayed.

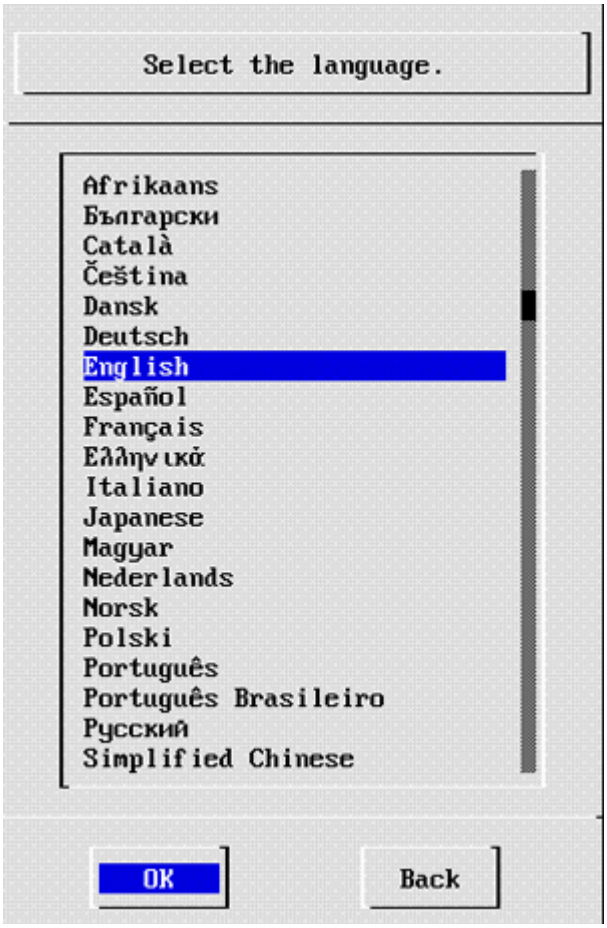

Figure C-5 Language Selection Menu

5. Select a language and click **OK**. The Main Menu (Figure C-6 on page 243) is displayed.

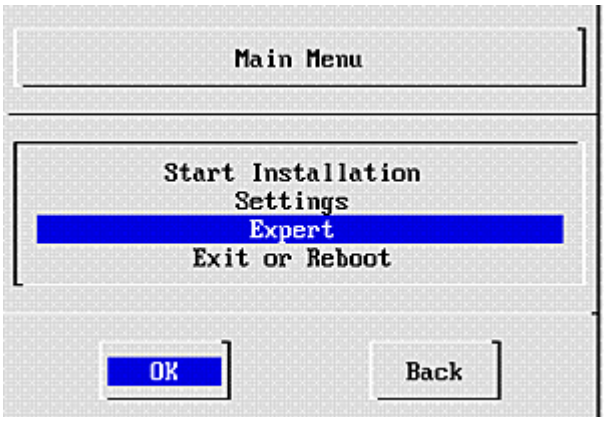

Figure C-6 Main Menu

6. Select **Expert** and click **OK**.The Expert menu (Figure C-7 on page 244) is displayed.

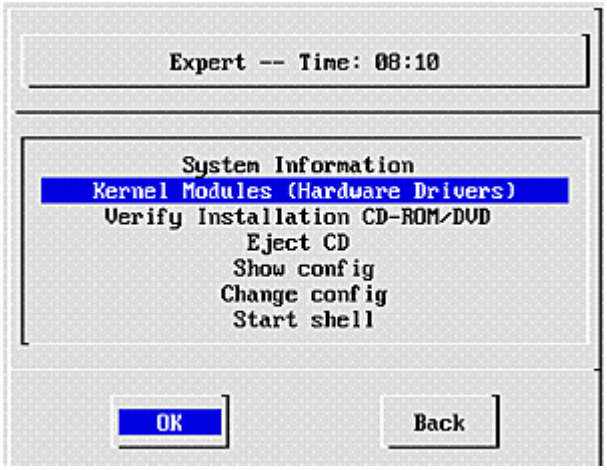

Figure C-7 Expert Menu

7. Select **Kernel Modules (Hardware Drivers)** and click **OK**. The Kernel Modules (Hardware Drivers) menu (Figure C-8 on page 244) is displayed.

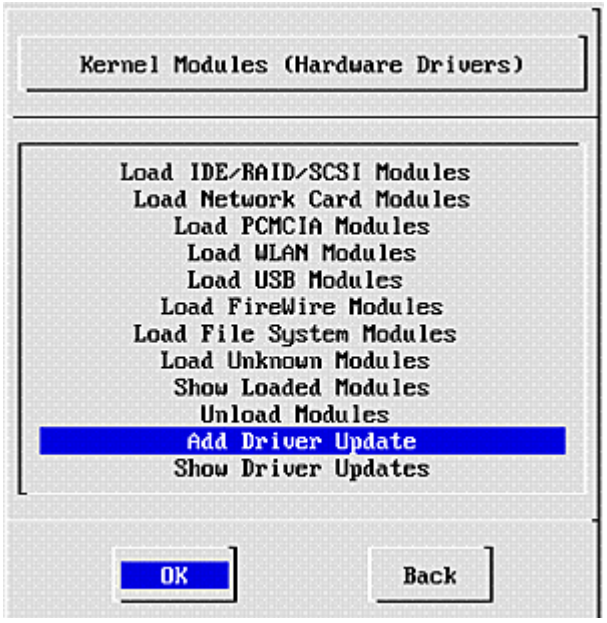

Figure C-8 Kernel Modules (Hardware Drivers) Menu

8. Select **Add Driver Update** and click **OK**. The Driver Update Medium Selection listing (Figure C-9 on page 245) is displayed.

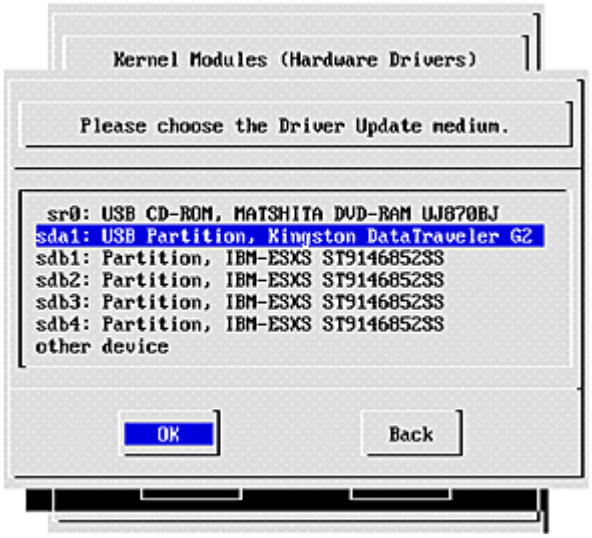
Kernel Modules (Hardware Drivers)
Please choose the Driver Update medium.
sr0: USB CD-ROM, MATSHITA DVD-RAM UJ870BJ
sda1: USB Partition, Kingston DataTraveler G2
sdb1: Partition, IBM-ESXS ST914685 2SS
sdb2: Partition, IBM-ESXS ST914685 2SS
sdb3: Partition, IBM-ESXS ST914685 2SS
sdb4: Partition, IBM-ESXS ST914685 2SS
other device
OK
Back

Figure C-9 Driver Update Medium Selection Listing

9. Select a medium and click **OK**. The Driver Update List confirmation dialog box (Figure C-10 on page 245) is displayed.

Figure C-10 Driver Update List Dialog Box

10. Click **OK**. The Expert menu (Figure C-7 on page 244) is displayed.
11. Click **Back**.

    The Main Menu (Figure C-6 on page 243) is displayed.
12. Select **Start Installation** and click **OK**.

The Source Medium Selection menu (Figure C-11 on page 246) is displayed.

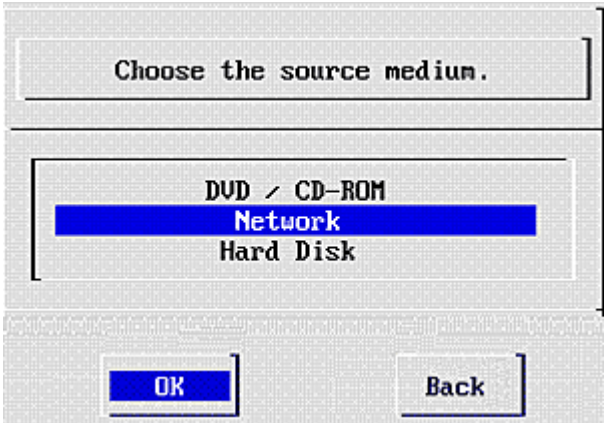

Figure C-11 Source Medium Selection Menu

13. Select **Network** and click **OK**.The Network Protocol Selection menu (Figure C-12 on page 246) is displayed.

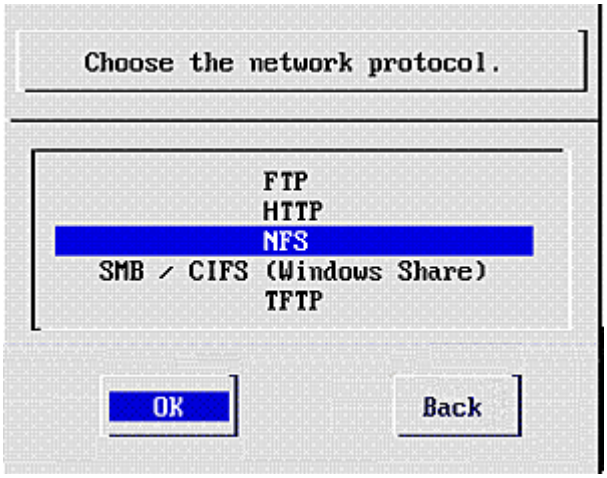

Figure C-12 Network Protocol Selection Menu

14. Select **NFS** and click **OK**. The Network Device Selection listing (Figure C-13 on page 247) is displayed.

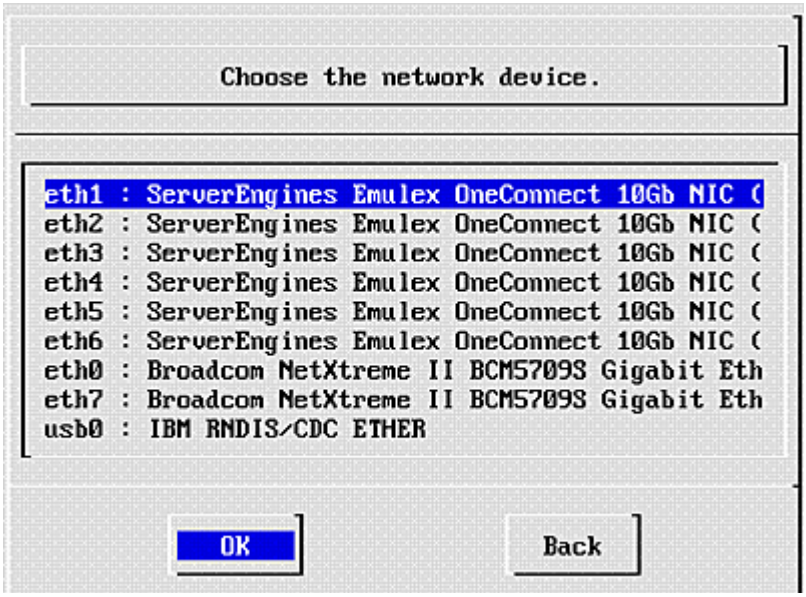
Choose the network device.
eth1 : ServerEngines Emulex OneConnect 10Gb NIC (
eth2 : ServerEngines Emulex OneConnect 10Gb NIC (
eth3 : ServerEngines Emulex OneConnect 10Gb NIC (
eth4 : ServerEngines Emulex OneConnect 10Gb NIC (
eth5 : ServerEngines Emulex OneConnect 10Gb NIC (
eth6 : ServerEngines Emulex OneConnect 10Gb NIC (
eth0 : Broadcom NetXtreme II BCM5709S Gigabit Eth
eth7 : Broadcom NetXtreme II BCM5709S Gigabit Eth
usb0 : IBM RNDIS/CDC ETHER
OK
Back

Figure C-13 Network Device Selection Listing

15. Select the device and click **OK**. The DHCP request is sent. A dialog box (Figure C-14 on page 247) prompts you to enter the IP address of the NFS server.

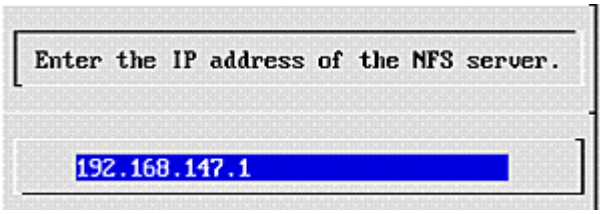

Figure C-14 NFS Server IP Address Dialog Box

16. Enter the IP address and press **<Enter>**. A dialog box (Figure C-15 on page 247) prompts you to enter the directory path of the server.

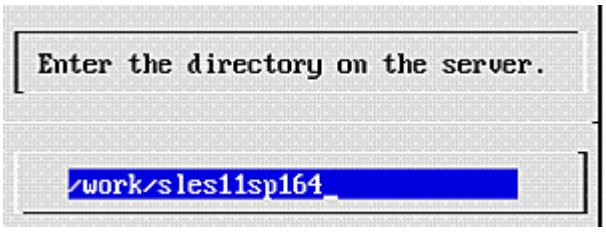

Figure C-15 Server Directory Dialog Box

17. Enter the directory path and press **<Enter>**. Information similar to Figure C-16 on page 248 and Figure C-17 on page 248 is displayed.

```
starting syslogd (logging to /dev/tty4)... ok
starting klogd... ok
starting yast...
```

Figure C-16 Starting Script

```
SUSE Linux Enterprise Server 11 Installation

- there are shells running on consoles 2, 5, 6, 9
- use 'extend' to load extensions (remove with 'extend -r'); extensions are:
    o bind, gdb, sax2
- network setup: run, e.g. 'dhcpcd eth0'
- sshd: run 'rcsshd start' (don't forget to set a password with 'passwd')

/ # modinfo be2net
filename:       /lib/modules/2.6.32.12-0.7-default/initrd/be2net.ko
supported:      external
license:        GPL
author:         ServerEngines Corporation
description:    ServerEngines BladeEngine 10Gbps NIC Driver 2.103.358.0
version:        2.103.358.0
srcversion:     738ZDCFE6EFA5CA10009192
alias:          pci:v000019A2d00000710sv*sd*bc*sc*i*
alias:          pci:v000019A2d00000700sv*sd*bc*sc*i*
alias:          pci:v000019A2d00000221sv*sd*bc*sc*i*
alias:          pci:v000019A2d00000211sv*sd*bc*sc*i*
depends:
supported:      yes
vermagic:       2.6.32.12-0.7-default SMP mod_unload modversions
parm:           rx_frag_size:Size of receive fragment buffer  - 2048 (default), 4096 or 819
parm:           num_vfs:Number of PCI VFs to initialize (max 16) (uint)
parm:           msix:Enable and disable the MSIx (By default MSIx is enabled) (uint)
parm:           multi_rxq:Multi Rx Queue support. Enabled by default (uint)
/ #
```

Figure C-17 Driver Update Confirmation

UEFI NIC IPv6 PXE Setup Procedure for SLES11 SP2

This section provides UEFI NIC PXE setup instructions for configuring IPv6 on the SLES11 SP2 operating system.

Setup Information

- PXE server: CISCO UCS C240 with SLES11 SP2 operating system
- PXE client server: DELL R620 Server F6PCP adapter installed

PXE Server Setup

Launch 'yast2'

Configure Network Adapter

1. In the Network Devices section, select **Network Settings**.
2. Select the adapter port you wish the PXE server to use, then click **Edit**.
3. Select **Statically assigned IP Address** and enter the following settings:
   - IP Address: 192.168.1.1
   - Subnet Mask: /24
4. Under the Additional Addresses section, click **Add** to add an alias.
   - Alias Name: ipv6static
   - IP Address: fc00:ba49:1625:fb0f::137
   - Netmask: /64
5. Click **OK**.

Disable Firewall

1. In the Security and Users section, select **Firewall**.
2. Select **Disable Firewall Automatic Starting**.
3. Click **Stop Firewall Now**.

Install Services

1. In the Network Services section, select **DHCP Server**.
2. Choose to install and accept all defaults.
3. Install NFS server, TFTP server, and FTP server one by one by accepting all defaults.

Configure DHCPD6

```
Brussels-sles11sp2:~ # vim /etc/dhcpd6.conf

   default-lease-time 2592000;
   preferred-lifetime 604800;
   option dhcp-renewal-time 3600;
   option dhcp-rebinding-time 7200;
   allow leasequery;
   option dhcp6.name-servers fc00:ba49:1625:fb0f::1;
   option dhcp6.domain-search "pxetest.org";
   option dhcp6.info-refresh-time 21600;
   option dhcp6.bootfile-url code 59 = string;
   # The subnet where the server is attached
   # (i.e., the server has an address in this subnet)
   subnet6 fc00:ba49:1625:fb0f::/64 {
   option dhcp6.bootfile-url "tftp://[fc00:ba49:1625:fb0f::137]/bootx64.efi";
   # Nine addresses available to clients
   # (the tenth client should get NoAddrsAvail)
   range6 fc00:ba49:1625:fb0f::42:10 fc00:ba49:1625:fb0f::42:99;
   # Use the whole /64 prefix for temporary addresses
   # (i.e., direct application of RFC 4941)
   range6 fc00:ba49:1625:fb0f:: temporary;
   }
```

Edit /etc/sysconfig/dhcpd and verify DHCPD6_INTERFACE is set to the network adapter port on which you want the DHCP server to listen.

```
   DHCPD6_INTERFACE="ethx"
```

Configure TFTP

```
Brussels-sles11sp2:~ # vim  /etc/xinetd.d/tftp
   # default: off
   # description: tftp service is provided primarily for booting or when a \
   #      router need an upgrade. Most sites run this only on machines acting as
   #       "boot servers".
   service tftp
   {
           socket_type     = dgram
           protocol        = udp
           wait            = yes
           flags           = IPv6 IPv4
           user            = root
           server          = /usr/sbin/in.tftpd
           server_args     =  -s /tftpboot
           disable         = no
           per_source      = 11
           cps             = 100 2
   }
```

Configure ELILO Boot Loader

Retrieve ELILO from the installation DVD and create a configuration file:

1. Place the first SUSE Linux Enterprise Server install DVD in the DVD drive of the PXE Server.
2. Open a root terminal.
3. Mount the boot image and copy the contents.

```
Brussels-sles11sp2:~ # mkdir /tmp/efi-img
Brussels-sles11sp2:~ # mount -o loop /media/<name of disc>/boot/x86_64/efi
/tmp/efi-img
Brussels-sles11sp2:~ #  cp /tmp/efi-img/efi/boot/*   /tftpboot
```

Create /tftpboot/elilo.conf with the Following Contents

```
Brussels-sles11sp2:~ # vim  /tftpboot/elilo.conf
prompt
   timeout=50
   delay=100
image=/linux
   label=suse
   initrd=/initrd
   append="install=ftp://[fc00:ba49:1625:fb0f::137]/sles  ipv6only=1  sysrq=1
   dd  vga=791 manual=1 textmode=0 showopts"
```

Copy Installation Files for FTP Transfer

```
Brussels-sles11sp2:~ #  cd   /media/<name of disc>
Brussels-sles11sp2:~ #  mkdir   /srv/ftp/sles
Brussels-sles11sp2:~ #  cp -r *  /srv/ftp/sles
```

Configure FTP to Enable Support for IPv6

```
Brussels-sles11sp2:~ # vim     /etc/vsftpd.conf
   # Activate directory messages - messages given to remote users when they
   # go into a certain directory.
   #
   dirmessage_enable=YES
   #
   # It is recommended that you define on your system a unique user which the
   # ftp server can use as a totally isolated and unprivileged user.
   #
   nopriv_user=ftpsecure
   #
   # You may fully customise the login banner string:
   #
   #ftpd_banner="Welcome to FOOBAR FTP service."
   #
   # You may activate the "-R" option to the builtin ls. This is disabled by
   # default to avoid remote users being able to cause excessive I/O on large
```

```
# sites. However, some broken FTP clients such as "ncftp" and "mirror" assume
# the presence of the "-R" option, so there is a strong case for enabling it.
#
#ls_recurse_enable=YES
#
# You may specify a file of disallowed anonymous e-mail addresses. Apparently
# useful for combatting certain DoS attacks.
#
#deny_email_enable=YES
#
# (default follows)
#
#banned_email_file=/etc/vsftpd.banned_emails
#
# If  enabled,  all  user  and  group  information in
# directory listings will be displayed as "ftp".
#
#hide_ids=YES

# Local FTP user Settings
#
# Uncomment this to allow local users to log in.
#
#local_enable=YES
#
# Default umask for local users is 077. You may wish to change this to 022,
# if your users expect that (022 is used by most other ftpd's)
#
#local_umask=022
#
# Uncomment to put local users in a chroot() jail in their home directory
# after login.
#
#chroot_local_user=YES
#
# You may specify an explicit list of local users to chroot() to their home
# directory. If chroot_local_user is YES, then this list becomes a list of
# users to NOT chroot().
#
#chroot_list_enable=YES
#
# (default follows)
#
#chroot_list_file=/etc/vsftpd.chroot_list
#
# The maximum data transfer rate permitted, in bytes per second, for
# local authenticated users. The default is 0 (unlimited).
#
```

```
#local_max_rate=7200
# Anonymus FTP user Settings
#
# Allow anonymous FTP?
#
anonymous_enable=YES
#
# Anonymous users will only be allowed to download files which are
# world readable.
#
anon_world_readable_only=YES
#
# Uncomment this to allow the anonymous FTP user to upload files. This only
# has an effect if the above global write enable is activated. Also, you will
# obviously need to create a directory writable by the FTP user.
#
anon_upload_enable=YES
#
# Default umask for anonymus users is 077. You may wish to change this to 022,
# if your users expect that (022 is used by most other ftpd's)
#
#anon_umask=022
#
# Uncomment this if you want the anonymous FTP user to be able to create
# new directories.
#
anon_mkdir_write_enable=YES
#
# Uncomment this to enable anonymus FTP users to perform other write
operations
# like deletion and renaming.
#
anon_other_write_enable=YES
#
# If you want, you can arrange for uploaded anonymous files to be owned by
# a different user. Note! Using "root" for uploaded files is not
# recommended!
#
#chown_uploads=YES
#chown_username=whoever
#
# The maximum data transfer rate permitted, in bytes per second, for anonymous
# authenticated users. The default is 0 (unlimited).
#
#anon_max_rate=7200
# Log Settings
#
# Log to the syslog daemon instead of using an logfile.
```

```
#
syslog_enable=YES
#
# Uncomment this to log all FTP requests and responses.
#
#log_ftp_protocol=YES
#
# Activate logging of uploads/downloads.
#
#xferlog_enable=YES
#
# You may override where the log file goes if you like. The default is shown
# below.
#
#vsftpd_log_file=/var/log/vsftpd.log
#
# If you want, you can have your log file in standard ftpd xferlog format.
# Note: This disables the normal logging unless you enable dual_log_enable
below.
#
#xferlog_std_format=YES
#
# You may override where the log file goes if you like. The default is shown
# below.
#
#xferlog_file=/var/log/xferlog
#
# Enable this to have booth logfiles. Standard xferlog and vsftpd's own style
log.
#
#dual_log_enable=YES
#
# Uncomment this to enable session status information in the system process
listing.
#
#setproctitle_enable=YES
# Transfer Settings
#
# Make sure PORT transfer connections originate from port 20 (ftp-data).
#
connect_from_port_20=YES
#
# You may change the default value for timing out an idle session.
#
#idle_session_timeout=600
#
# You may change the default value for timing out a data connection.
#
#data_connection_timeout=120
```

```
#
# Enable this and the server will recognise asynchronous ABOR requests. Not
# recommended for security (the code is non-trivial). Not enabling it,
# however, may confuse older FTP clients.
#
#async_abor_enable=YES
#
# By default the server will pretend to allow ASCII mode but in fact ignore
# the request. Turn on the below options to have the server actually do ASCII
# mangling on files when in ASCII mode.
# Beware that turning on ascii_download_enable enables malicious remote
parties
# to consume your I/O resources, by issuing the command "SIZE /big/file" in
# ASCII mode.
# These ASCII options are split into upload and download because you may wish
# to enable ASCII uploads (to prevent uploaded scripts etc. from breaking),
# without the DoS risk of SIZE and ASCII downloads. ASCII mangling should be
# on the client anyway..
#
#ascii_upload_enable=YES
#ascii_download_enable=YES
#
# Set to NO if you want to disallow the  PASV  method of obtaining a data
# connection.
#
#pasv_enable=NO
# PAM setting. Do NOT change this unless you know what you do!
#
pam_service_name=vsftpd
# Set to ssl_enable=YES if you want to enable SSL
ssl_enable=NO
# Limit passive ports to this range to assis firewalling
pasv_min_port=30000
pasv_max_port=30100
anon_mkdir_write_enable=YES
anon_root=/srv/ftp
anon_upload_enable=YES
chroot_local_user=NO
ftpd_banner=Welcome message
idle_session_timeout=900
local_enable=YES
log_ftp_protocol=YES
max_clients=10
max_per_ip=3
pasv_enable=YES
ssl_sslv2=NO
ssl_sslv3=NO
ssl_tlsv1=YES
```

```
write_enable=YES
listen=NO
listen_ipv6=YES
```

Restart the Necessary Services

```
Service nfsserver restart
Service xinetd restart
Service vsftpd restart
Service dhcpd6 restart
```

PXE Client Setup

To set up the PXE client:

1. Boot the server and press **<F2>** to enter system setup.
2. Select **System BIOS Settings > Boot Settings** and change the boot mode to UEFI.
3. Reboot the server.
4. Press **<F2>** to enter system setup.
5. Select **System BIOS Settings > Boot Settings > UEFI Boot Settings** and set the UEFI PXE boot protocol to IPv6 (Figure C-18 on page 256).

System Setup
System BIOS
System BIOS Settings • Boot Settings • UEFI Boot Settings
Integrated NIC 1 Port 1: EFI Network 1
Integrated NIC 1 Port 2: EFI Network 2
Integrated NIC 1 Port 3: EFI Network 3
Integrated NIC 1 Port 4: EFI Network 4
Boot Option Enable/Disable
Integrated RAID Controller 1: SUSE Linux Enterprise Server 11 SP2
Embedded SATA Port Optical Drive E: HL-DT-ST DVD-ROM DU60N
Disk connected to back USB 1: Cruzer Pop
Integrated NIC 1 Port 1: EFI Network 1
Integrated NIC 1 Port 2: EFI Network 2
Integrated NIC 1 Port 3: EFI Network 3
Integrated NIC 1 Port 4: EFI Network 4
UEFI PXE boot protocol
IPv4
IPv6

Figure C-18 UEFI Boot Settings Screen

6. Reboot the server.

7. Press **<F11>** and enter the UEFI boot manager. The Boot Manager Main Menu screen (Figure C-19 on page 257) is displayed.

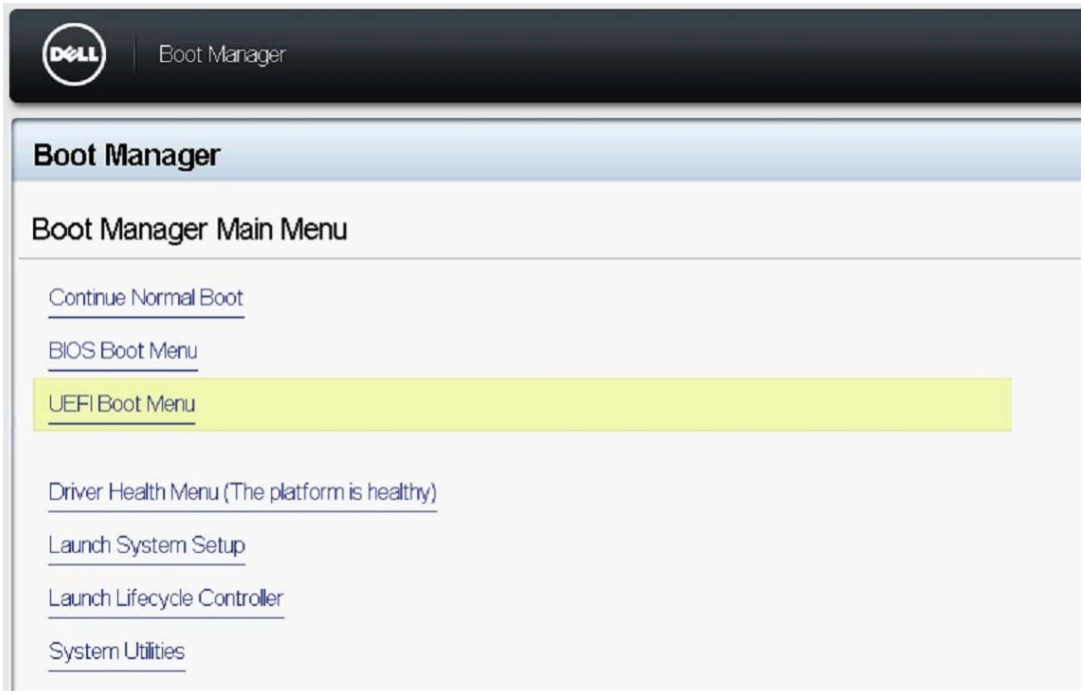

Figure C-19 Boot Manager Main Menu Screen

8. Select **UEFI Boot Menu**. The UEFI Boot Menu screen (Figure C-20 on page 258) is displayed.

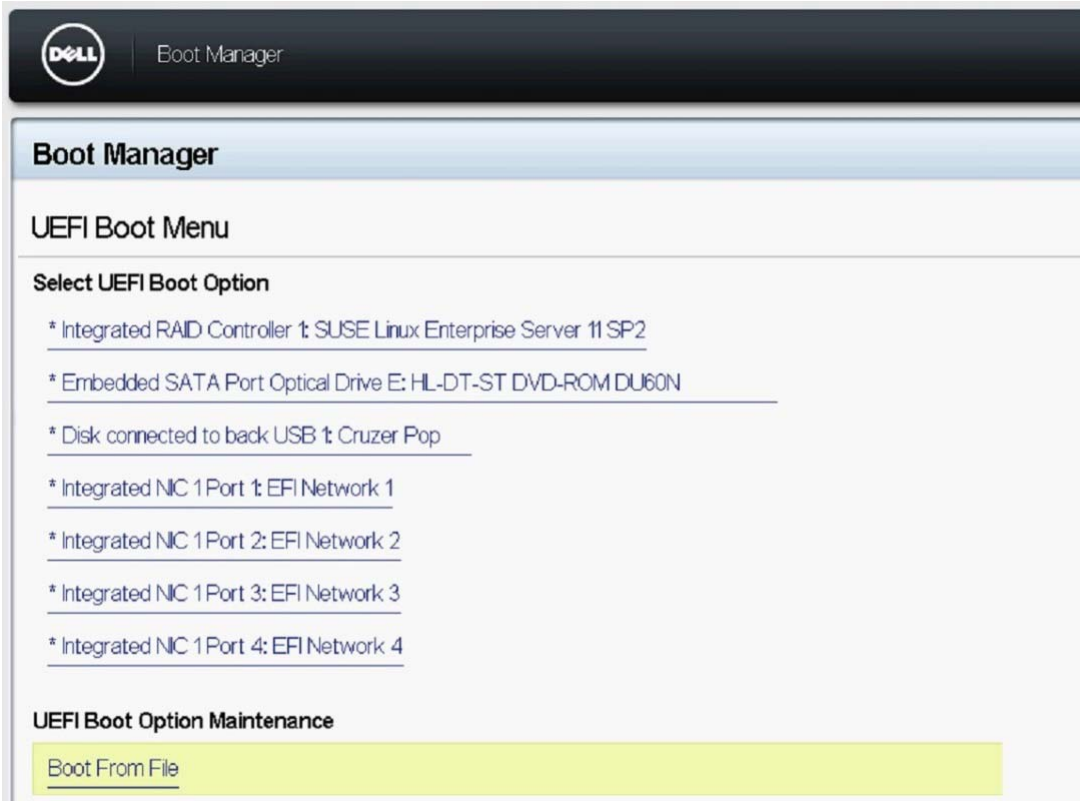
Boot Manager
Boot Manager
UEFI Boot Menu
Select UEFI Boot Option
* Integrated RAID Controller 1: SUSE Linux Enterprise Server 11 SP2
* Embedded SATA Port Optical Drive E: HL-DT-ST DVD-ROM DU60N
* Disk connected to back USB 1: Cruzer Pop
* Integrated NIC 1 Port 1: EFI Network 1
* Integrated NIC 1 Port 2: EFI Network 2
* Integrated NIC 1 Port 3: EFI Network 3
* Integrated NIC 1 Port 4: EFI Network 4
UEFI Boot Option Maintenance
Boot From File

Figure C-20 UEFI Boot Menu Screen

9. Select **Boot From File**. The File Explorer screen (Figure C-21 on page 259) is displayed.

Boot Manager
File Explorer
File Explorer
*[NO VOLUME LABEL] Integrated RAID Controller 1
*[RAHUL] Disk connected to back USB 1: Cruzer Pop
*[Load File] Integrated NIC 1 Port 1:
*[Load File] Integrated NIC 1 Port 2:
*[Load File] Integrated NIC 1 Port 3:
*[Load File] Integrated NIC 1 Port 4:

Figure C-21 File Explorer Screen

10. Select the port on the client through which PXE boot must be performed and press **<Enter>**. A status message is displayed and then the Language Selection menu is displayed (Figure C-22 on page 260).

Figure C-22 Language Selection Menu

11. Select a language and click **OK**. The Main Menu (Figure C-23 on page 260) is displayed.

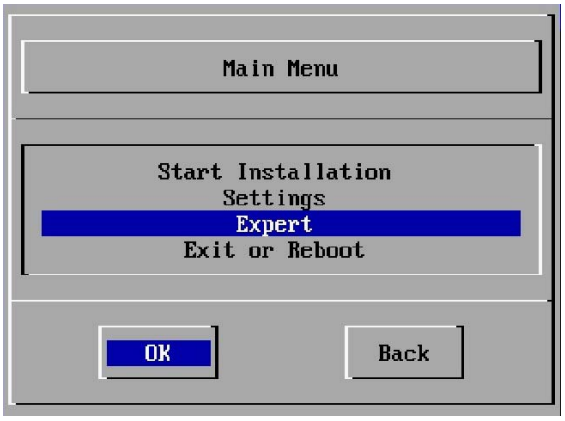

Figure C-23 Main Menu

12. Select **Expert** and click **OK**. The Expert menu (Figure C-24 on page 261) is displayed.

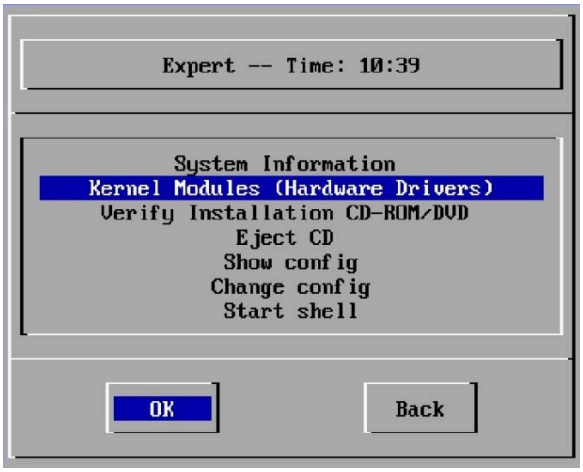

Figure C-24 Expert Menu

13. Select **Kernel Modules (Hardware Drivers)** and click **OK**. The Kernel Modules (Hardware Drivers) menu (Figure C-25 on page 261) is displayed.

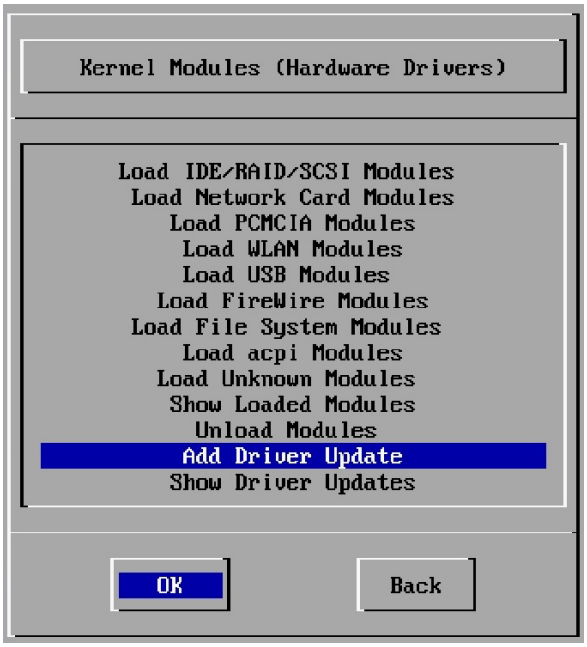

Figure C-25 Kernel Modules (Hardware Drivers) Menu

14. Select **Add Driver Update** and click **OK**. The Driver Update Medium Selection list (Figure C-26 on page 262) is displayed.

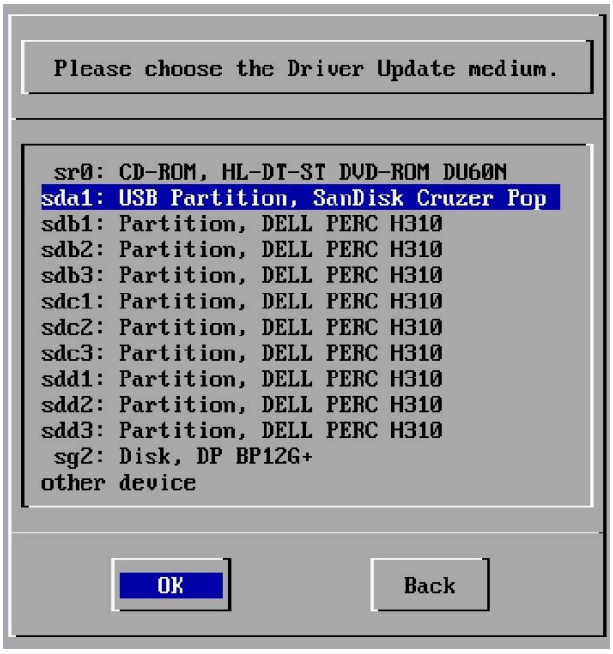
Please choose the Driver Update medium.
sr0: CD-ROM, HL-DT-ST DVD-ROM DU60N
sda1: USB Partition, SanDisk Cruzer Pop
sdb1: Partition, DELL PERC H310
sdb2: Partition, DELL PERC H310
sdb3: Partition, DELL PERC H310
sdc1: Partition, DELL PERC H310
sdc2: Partition, DELL PERC H310
sdc3: Partition, DELL PERC H310
sdd1: Partition, DELL PERC H310
sdd2: Partition, DELL PERC H310
sdd3: Partition, DELL PERC H310
sg2: Disk, DP BP12G+
other device
OK
Back

Figure C-26 Driver Update Medium Selection List

15. Select a medium from the list and click **OK**. The Expert menu (Figure C-24 on page 261) is displayed.
16. Click **Back**. The Main Menu (Figure C-23 on page 260) is displayed.
17. Select **Start Installation** and click **OK**. The Source Medium list (Figure C-27 on page 262) is displayed.

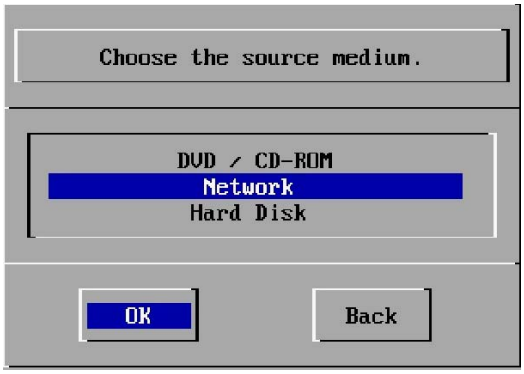

Figure C-27 Source Medium List

18. Select **Network** and click **OK**. The Network Protocol list (Figure C-28 on page 263) is displayed.

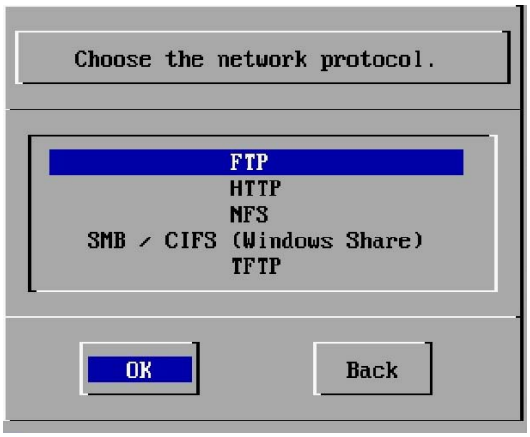

Figure C-28 Network Protocol List

19. Select **FTP** and click **OK**. The Network Device list (Figure C-29 on page 263) is displayed.

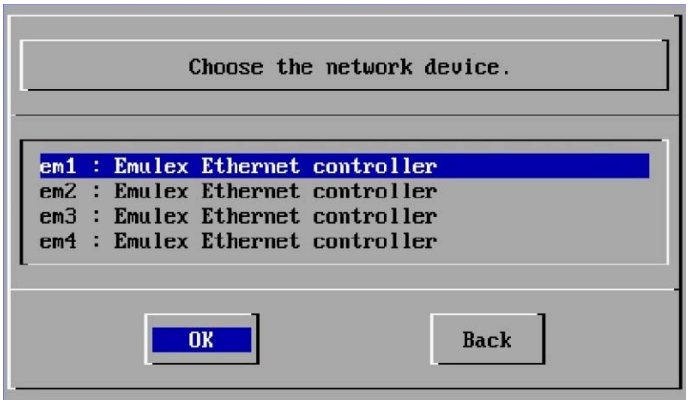

Figure C-29 Network Device List

20. Select the device and click **OK**. A dialog box (Figure C-30 on page 263) prompts you for automatic configuration using DHCP.

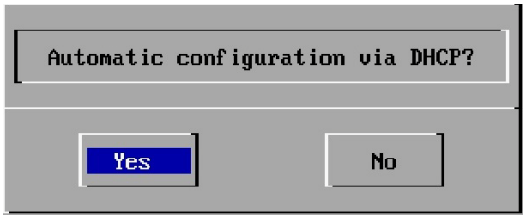

Figure C-30 Automatic Configuration via DHCP Dialog Box

21. Click **Yes**. The DHCP6 request is sent. A dialog box (Figure C-31 on page 264) prompts you to enter the IPv6 address of the FTP server.

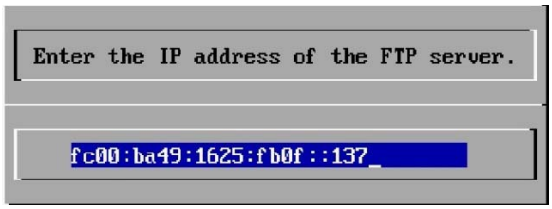

Figure C-31 FTP Server IPv6 Address Dialog Box

22. Enter the IPv6 address and press <Enter>. A dialog box (Figure C-32 on page 264) prompts you to enter the directory path of the server.

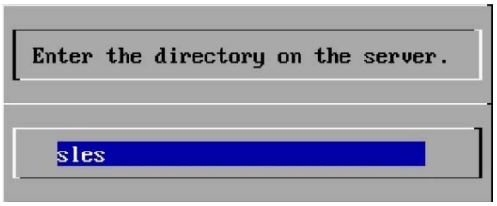

Figure C-32 Server Directory Path Dialog Box

23. Enter the server's directory path and press **<Enter>**. A pop-up will appear if you must enter a username and password for the FTP server.
24. Select **NO** for this selection and select **NO** for using HTTP Proxy. The installation begins and the License Agreement page is displayed.
25. After you accept the license agreement, all of the operating system packages are downloaded using FTP over IPv6.

Appendix D. Example for Installing and Booting UEFI FCoE

The following steps use the Linux SLES operating system as an example.

1. Boot to UEFI linux from DVD.
2. Select UEFI boot from the BIOS boot manager or boot to shell and execute /efi/boot/elilo.efi from removable media.
3. Follow normal boot instructions from YaST.
4. During the Installation Settings, select **Partitioning**, then select **Custom partitioning (for experts)**.
5. In **SystemViews**, select a hard disk.
6. Select the **Partitions** tab (Figure D-1 on page 265).
7. Delete any old partitions on the disk.
8. To create a GPT disklabel (UEFI does not support booting from disks with an MS-DOS partition table), click **Expert** (above the Accept button).
9. Create a partition table and check GPT (required for UEFI boot).

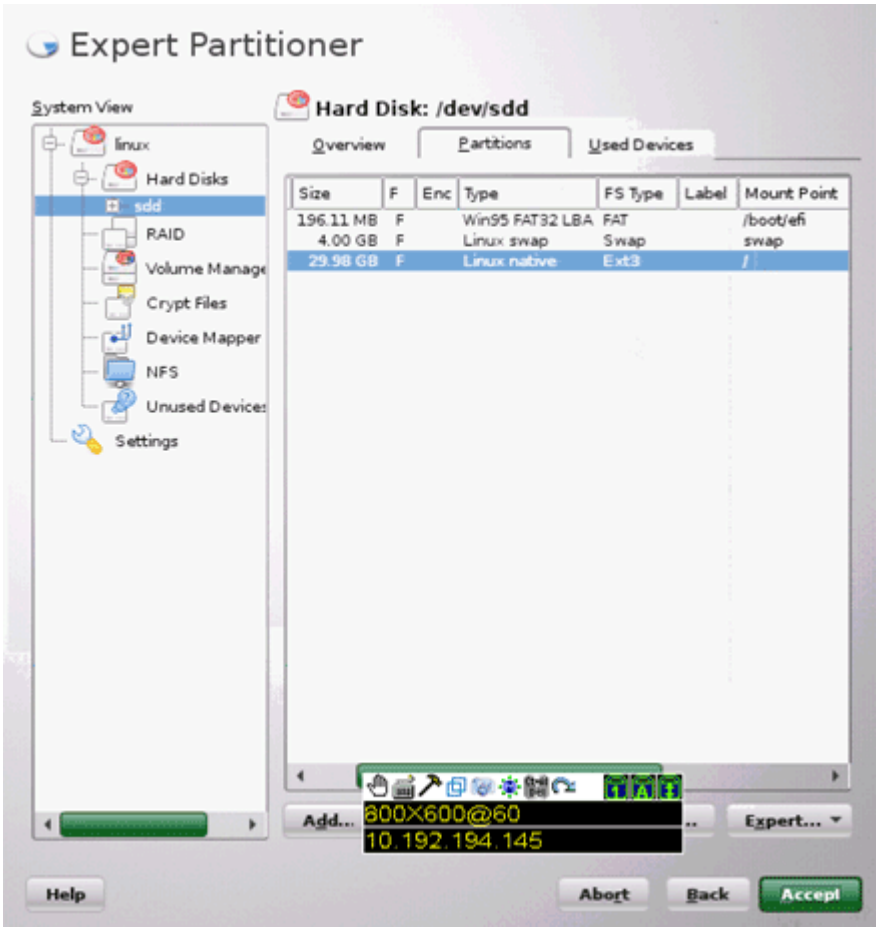

Figure D-1 Partitions Tab

10. To add an UEFI system partition (VFAT or FAT), click **Add**.
11. Select a custom size (100-400MB) depending on what UEFI driver and utilities you want to store on the UEFI system partition. In general, using 200MB is sufficient if the plug-in card detail for UEFI system partition is unknown.
12. In the Formatting options dialog box, select **Format Partition > File system > FAT**.
13. Under Mounting options, select **/boot/efi** and click **Finish**. The boot drive now has a GPT disk label that contains a FAT EFI boot partition.
14. Perform the remainder of the partitioning as with any Linux installation. The remainder of the installation is not unique to UEFI, for example, add a swap partition and an EXT3 partition for root.
15. After the installation is completed, view the partitions using the `parted -l` command.
16. When the system boots, SUSE Linux Enterprise Server 11 SP1 now shows in the system Start Options screen (Figure D-2 on page 266).

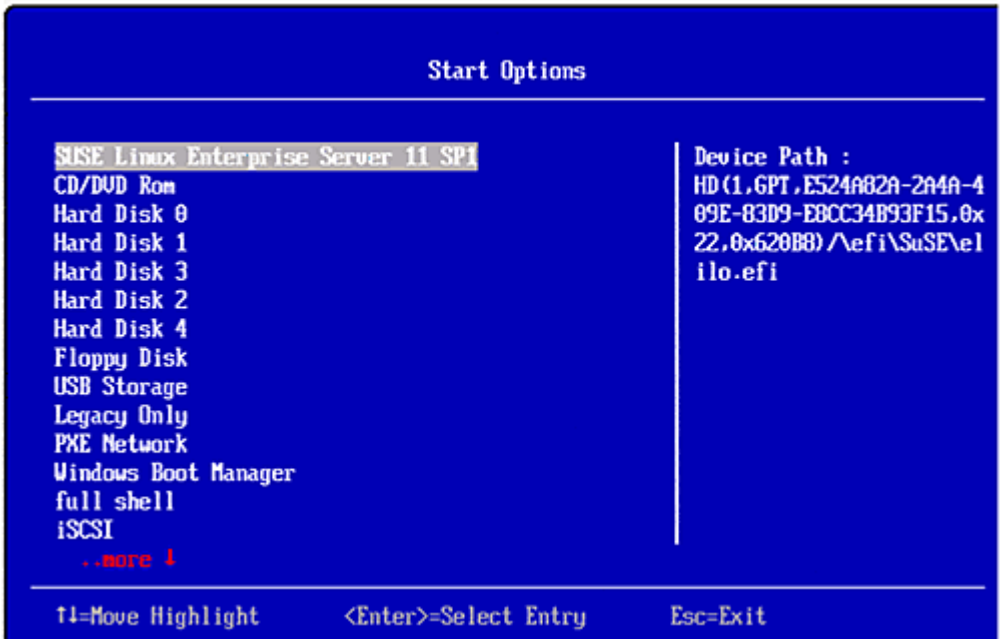

Figure D-2 UEFI FCoE Start Options Screen

Appendix E. Loading and Unloading UEFIBoot from the UEFI Shell

This section explains how to load and unload UEFIBoot from the UEFI shell.

Loading UEFIBoot from the UEFI Shell

The UEFI boot code is distributed with the firmware in a .UFI file. This file can be downloaded to a NIC, iSCSI, or FCoE adapter through the HII interface in the NIC UEFI code.

Unloading UEFIBoot from the UEFI Shell

To unload UEFIBoot:

1. View Emulex driver handle information by typing "`drivers`" and pressing **<Enter>** at the shell prompt. A list of drivers is displayed (Figure E-1 on page 267).

```
E1 0000000A B - -  2  3 Partition Driver(MBR/GPT/El Torito) FvFile(43B93232-AF
E2 0000000A B - -  1 48 PCI Bus Driver                      FvFile(93B80004-9F
E7 0000000A D - -  1  - SCSI Bus Driver                     FvFile(0167CCC4-D0
E8 0000000A ? - -  -  - Scsi Disk Driver                    FvFile(0A66E322-37
EF 00000001 D - -  1  - Vitesse VSC452 SIO Driver           FvFile(BBA81468-FF
F1 0000000A D - -  4  - Simple Network Protocol Driver      FvFile(A2F436EA-A1
F2 0000000A D - - 16  - UEFI PXE Base Code Driver           FvFile(3B1DEAB5-C7
F4 0000000A D - -  4  - PXE DHCPv4 Driver                   FvFile(A46C3330-BE
F5 0000000A B - -  4 12 MNP Network Service Driver          FvFile(025BBFC7-E6
F6 0000000A B - -  4 28 IP4 Network Service Driver          FvFile(9FB1A1F3-3B
F7 0000000A B - -  4  4 DHCP Protocol Driver                FvFile(94734718-0B
F8 0000000A D - -  4  - IP4 CONFIG Network Service Driver   FvFile(26841BDE-92
F9 0000000A D - -  4  - Tcp Network Service Driver          FvFile(6D6963AB-90
FA 0000000A B - - 24 20 UDP Network Service Driver          FvFile(6D6963AB-90
FB 0000000A D - -  4  - ARP Network Service Driver          FvFile(529D3F93-E8
FC 0000000A B - -  8  4 MTFTP4 Network Service              FvFile(DC3641B8-2F
FD 0000000A ? - -  -  - UEFI PXE Configuration Driver       FvFile(0C086DB5-AA
11C 00050212 B X X  1  1 Broadcom Gigabit Ethernet Driver    Offset(12000,231FF
11E 00050212 B X X  1  1 Broadcom Gigabit Ethernet Driver    Offset(12000,231FF
122 000221A5 B - X  2  2 Emulex 10G NIC                      Offset(8000,169FF)
126 000100AF D - -  2  - Emulex iSCSI Boot Driver            Offset(10000,1A5FF
143 030A0001 D X X  1  - LSI Logic Fusion MPT SAS Driver     Offset(B200,247FF)
```

Figure E-1 Driver Listing

2. Write down the Emulex NIC, FCoE, or iSCSI driver handles. For the above case, the Emulex NIC driver handle is 122 and the Emulex iSCSI driver handle is 126.
3. To unload the Emulex NIC driver in the previous example, type "`unload 122`" and press **<Enter>**.
4. To unload the Emulex iSCSI driver in the previous example, type "`unload 126`" and press **<Enter>**.

Appendix F. Dell UEFI

The following sections define and describe the fields and configuration settings for Dell adapters using the Dell UEFI utility.

The Dell UEFI adapter configuration utility is a unified configuration utility that enables you to configure all of the available protocols through a single GUI interface, unlike individual configuration utilities. The iSCSI and FCoE configuration can be configured using these menus even if those functions are not physically present. The configuration will be applied after those respective functions are enabled.

Accessing the Main Configuration Page

From the System Setup > Device Settings page (Figure F-1 on page 268), select the adapter that you want to view.

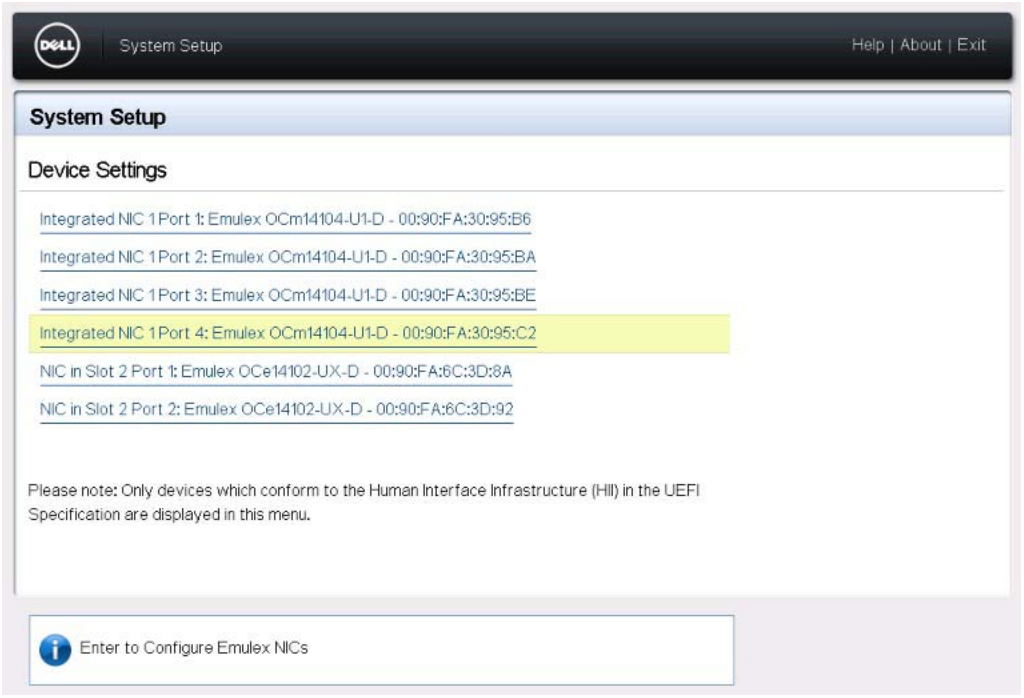
System Setup
Help | About | Exit
System Setup
Device Settings
Integrated NIC 1 Port 1: Emulex OCm14104-U1-D - 00:90:FA:30:95:B6
Integrated NIC 1 Port 2: Emulex OCm14104-U1-D - 00:90:FA:30:95:BA
Integrated NIC 1 Port 3: Emulex OCm14104-U1-D - 00:90:FA:30:95:BE
Integrated NIC 1 Port 4: Emulex OCm14104-U1-D - 00:90:FA:30:95:C2
NIC in Slot 2 Port 1: Emulex OCe14102-UX-D - 00:90:FA:6C:3D:8A
NIC in Slot 2 Port 2: Emulex OCe14102-UX-D - 00:90:FA:6C:3D:92
Please note: Only devices which conform to the Human Interface Infrastructure (HII) in the UEFI Specification are displayed in this menu.
Enter to Configure Emulex NICs

Figure F-1 Device Settings Page

The Main Configuration page (Figure F-2 on page 269) for that adapter is displayed.

Main Configuration Page

This page displays device information and enables you to configure device parameters.

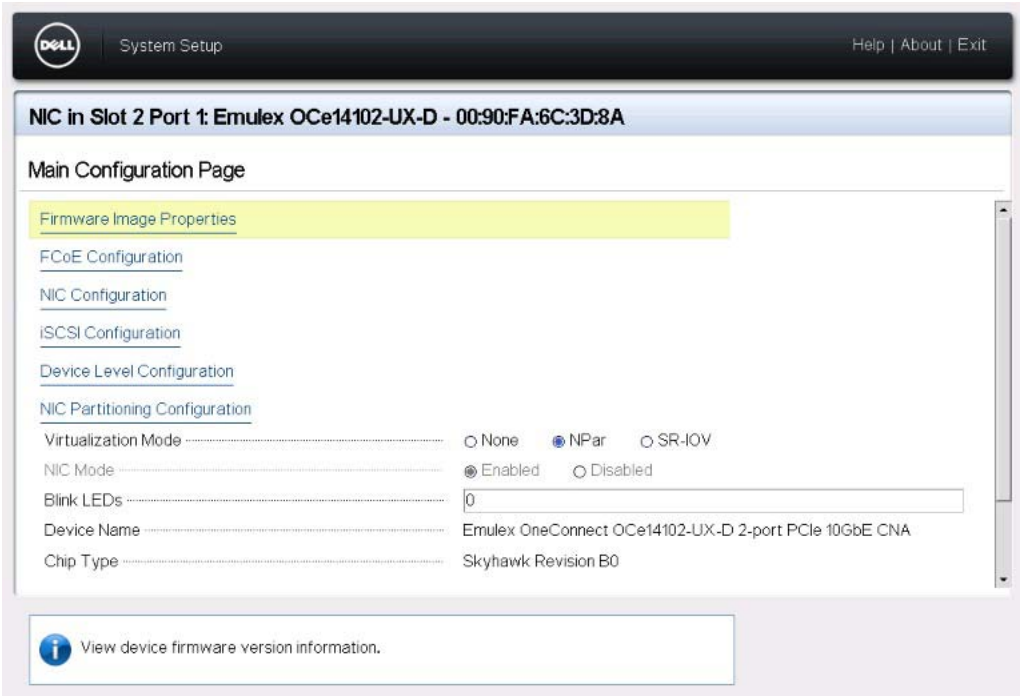

Figure F-2 Main Configuration Page

Table F-1 Main Configuration Page Menu Options

Menu Option	Description and Available Settings
Firmware Image Properties	View adapter firmware version information. See “Firmware Image Properties Page” on page 271 for more information.
FCoE Configuration	Configure FCoE boot parameters. See “FCoE Configuration Page” on page 272 for more information.
NIC Configuration	Configure boot protocol, Wake on LAN, link speed, and VLAN. See “NIC Configuration Page” on page 275 for more information.
iSCSI Configuration	Configure general, initiator, and target parameters for iSCSI boot. See “iSCSI Configuration Page” on page 277 for more information.
Device Level Configuration	View and configure global device level parameters. See “Device Level Configuration Page” on page 285 for more information.
NIC Partitioning Configuration	Configure functionality of NIC partitions and view assigned addresses. See “NIC Partitioning Configuration Page” on page 286 for more information.

Table F-1 Main Configuration Page Menu Options (Continued)

Menu Option	Description and Available Settings
Virtualization Mode	Specify the virtualization mode setting of the adapter. Available settings include: • None (default) • NPar • SR-IOV **Note:** Some menu options are not available if the Virtualization Mode is set to “None”.
NIC Mode	Always enabled.
Blink LEDs	Identify the physical port by blinking the port LED for up to 15 seconds. Available settings are 0 to 15 seconds (default).
Device Name	The name of the adapter.
Chip Type	The name and revision of the chip.
PCI Device ID	The PCI device ID of the port.
PCI Address	The PCI address assigned by the BIOS.
Link Status	The network link status reported by the adapter.

Firmware Image Properties Page

The Firmware Image Properties page (Figure F-3 on page 271) displays adapter firmware version information.

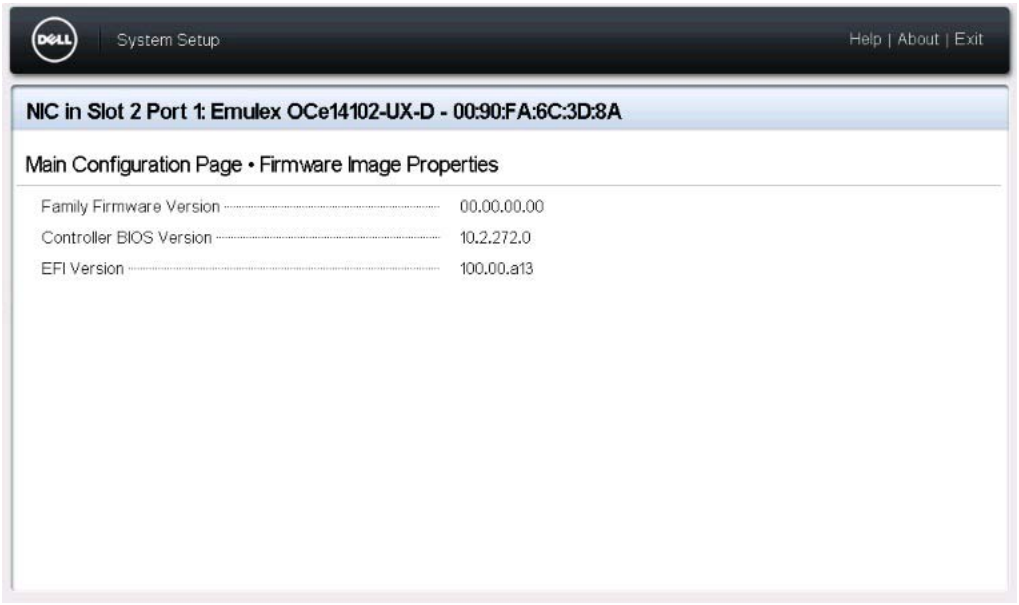

Figure F-3 Firmware Image Properties Page

Table F-2 Firmware Image Properties Page Menu Options

Menu Option	Description and Available Settings
Family Firmware Version	Firmware version information for the installed adapter.
Controller BIOS Version	BIOS version information for the installed adapter.
EFI Version	UEFI driver version information for the installed adapter.

FCoE Configuration Page

The FCoE Configuration page (Figure F-4 on page 272) allows you to configure FCoE boot parameters.

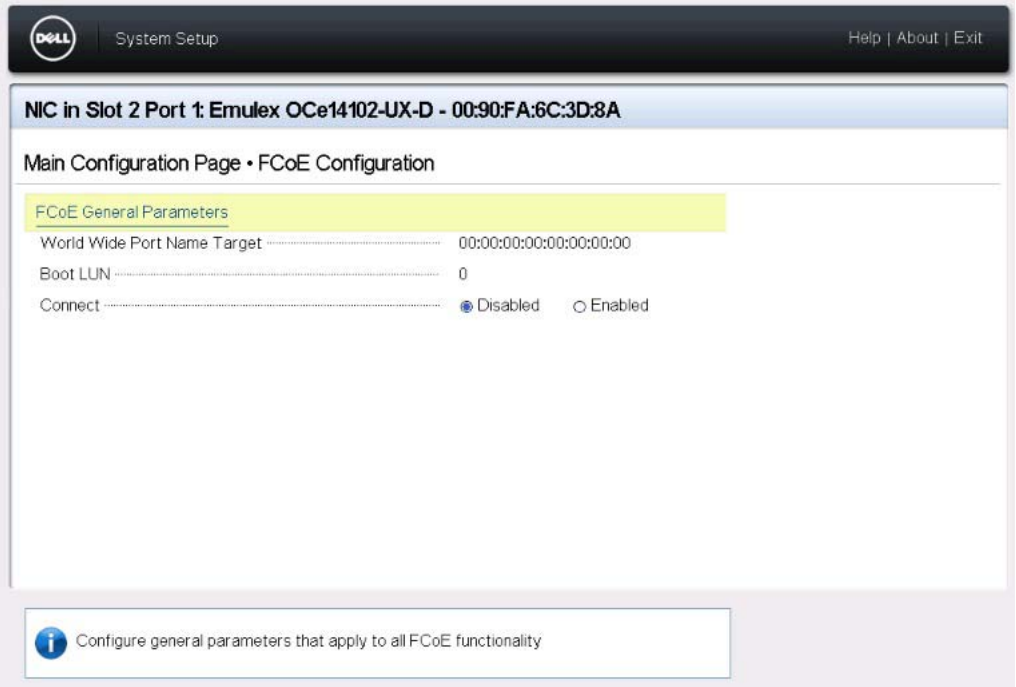

Figure F-4 FCoE Configuration Page

Table F-3 FCoE Configuration Page Menu Options

Menu Option	Description and Available Settings
FCoE General Parameters	Configure FCoE general parameters. See “FCoE General Parameters Page” on page 273 for more information.
World Wide Port Name Target	The first FCoE storage target’s WWPN. **Note:** The Boot Scan Selection option must be set to “Specified LUN” before you can update this field.
Boot LUN	The first FCoE storage target’s LUN that will be used by the FCoE initiator as the system boot device. **Note:** The Boot Scan Selection option must be set to “Specified LUN” before you can update this field.
Connect	Specify whether the FCoE initiator should connect to the first FCoE storage target defined. Available settings include: • Enabled • Disabled (default)

FCoE General Parameters Page

The FCoE General Parameters page (Figure F-5 on page 273) allows you to configure FCoE general parameters.

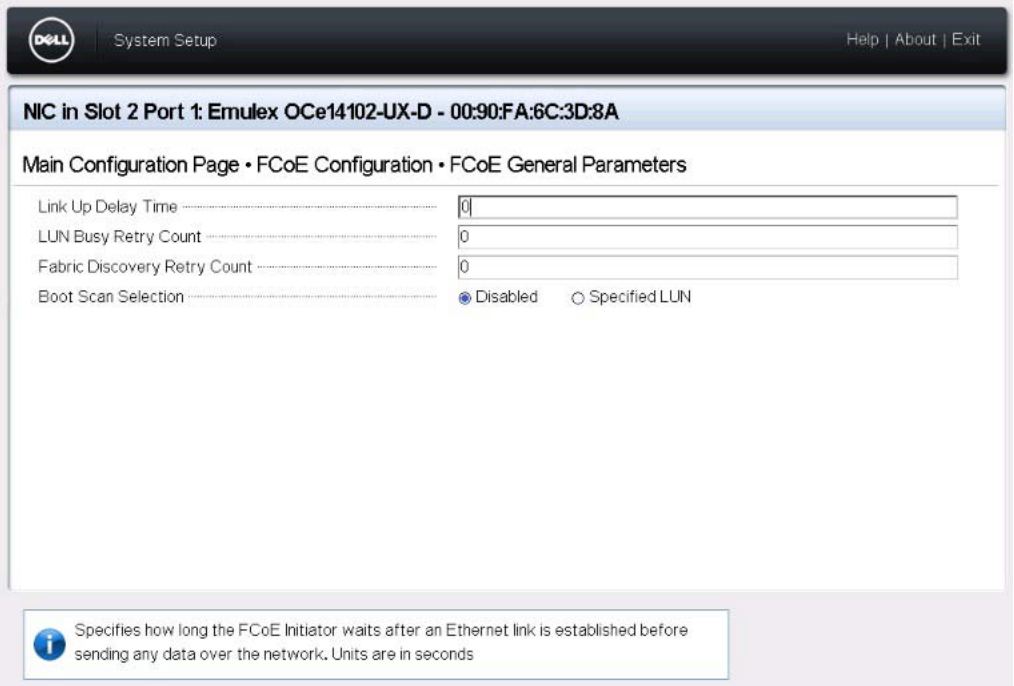
System Setup
Help | About | Exit
NIC in Slot 2 Port 1: Emulex OCe14102-UX-D - 00:90:FA:6C:3D:8A
Main Configuration Page • FCoE Configuration • FCoE General Parameters
Link Up Delay Time
0
LUN Busy Retry Count
0
Fabric Discovery Retry Count
0
Boot Scan Selection
Disabled
Specified LUN
Specifies how long the FCoE Initiator waits after an Ethernet link is established before sending any data over the network. Units are in seconds

Figure F-5 FCoE General Parameters Page

Table F-4 FCoE General Parameters Page Menu Options

Menu Option	Description and Available Settings
Link Up Delay Time	Specify how long (in seconds) the FCoE Initiator waits after an Ethernet link is established before sending any data over the network. The valid range is 0 to 255 seconds.
LUN Busy Retry Count	Specify the number of connection retries the FCoE boot initiator attempts if the FCoE target LUN is busy. The valid range is 0 to 60.
Fabric Discovery Retry Count	Specify the retry count for FCoE fabric discovery. The valid range is 0 to 60.

Table F-4 FCoE General Parameters Page Menu Options (Continued)

Menu Option	Description and Available Settings
Boot Scan Selection	Specify the adapter's initiator behavior for booting the system from specified FC boot targets or fabric discovered targets. Available settings include: • Disabled (default) – Initiator does not attempt to boot. • First LUN – Attempt boot from the first bootable LUN of the targets discovered by adapter. • First LUN 0 – Attempt boot from the first bootable LUN 0 of the targets discovered by adapter. • First LUN Not LUN 0 – Attempt boot from the first bootable LUN that is not LUN 0 of the targets discovered by adapter. • Fabric Discovered LUN – Attempt boot based on the LUN assignment provided by the fabric's management infrastructure. • Specified LUN – Initiator attempts to boot to the specified World Wide Port Name and LUN for the first target.

NIC Configuration Page

The NIC Configuration page (Figure F-6 on page 275) allows you to configure the boot protocol, Wake on LAN, link speed, and VLAN.

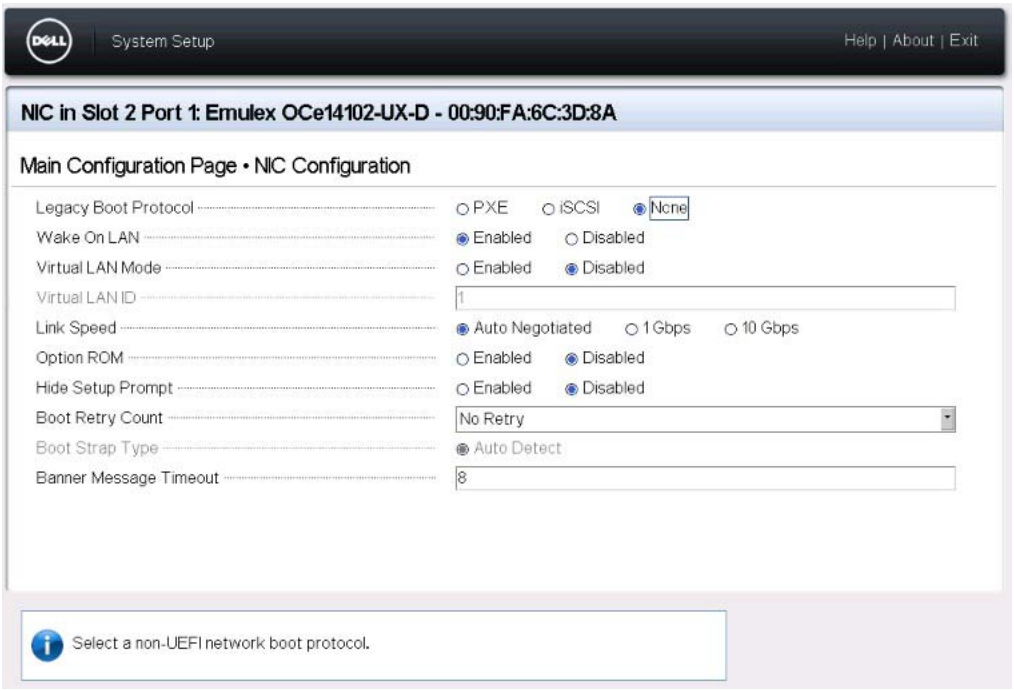

Figure F-6 NIC Configuration Page

Table F-5 NIC Configuration Page Menu Options

Menu Option	Description and Available Settings
Legacy Boot Protocol	Select a non-UEFI network boot protocol. Available settings include: • PXE • iSCSI • FCoE • None (default)
Wake On LAN	Enable or disable Wake On LAN. Available settings include: • Enabled (default) • Disabled
Virtual LAN Mode	Enable or disable virtual LAN mode. Available settings include: • Enabled • Disabled (default)
Virtual LAN ID	Specify the ID for VLAN Mode. The VLAN ID's valid range is 0 to 4095.

Table F-5 NIC Configuration Page Menu Options (Continued)

Menu Option	Description and Available Settings
Link Speed	Specify the port speed used for the selected protocol. Available settings include: • Auto Negotiated (default) • 1 Gbps • 10 Gbps
Option ROM	Enable or disable legacy boot protocols in the Option ROM. Available settings include: • Enabled • Disabled (default)
Hide Setup Prompt	Enable or disable the option ROM setup prompt (banner) during POST. Available settings include: • Enabled • Disabled (default)
Boot Retry Count	Control the number of retries in case of boot failure. Available settings include: • No Retry (default) • 1 Retry • 2 Retries • 3 Retries • 4 Retries • 5 Retries • 6 Retries • Indefinite Retries
Boot Strap Type	Control the boot strap method used to boot to the operating system. Available settings include: • Auto Detect (default)
Banner Message Timeout	Control the number of seconds that the Option ROM banner is displayed during POST. The valid range is 0 to 14. The default value is 8.

iSCSI Configuration Page

The iSCSI Configuration page (Figure F-7 on page 277) allows you to configure general, initiator, and target parameters for iSCSI boot.

System Setup
Help | About | Exit
NIC in Slot 2 Port 1: Emulex OCe14102-UX-D - 00:90:FA:6C:3D:8A
Main Configuration Page • iSCSI Configuration
iSCSI General Parameters
iSCSI Initiator Parameters
iSCSI First Target Parameters
iSCSI Second Target Parameters
iSCSI Secondary Device Parameters
Configure general iSCSI parameters.

Figure F-7 iSCSI Configuration Page

Table F-6 iSCSI Configuration Page Menu Options

Menu Option	Description and Available Settings
iSCSI General Parameters	Configure general iSCSI parameters. See "iSCSI General Parameters Page" on page 278 for more information.
iSCSI Initiator Parameters	Configures iSCSI initiator parameters. See "iSCSI Initiator Parameters Page" on page 280 for more information.
iSCSI First Target Parameters	Enable connection and configure parameters for the first iSCSI target. See "iSCSI First Target Parameters Page" on page 281 for more information.
iSCSI Second Target Parameters	Enable connection and configure parameters for the second iSCSI target. See "iSCSI Second Target Parameters Page" on page 283 for more information.
iSCSI Secondary Device Parameters	Configures the iSCSI secondary boot device parameters. See "iSCSI Secondary Device Parameters Page" on page 284 for more information.

iSCSI General Parameters Page

The iSCSI General Parameters page (Figure F-8 on page 278) allows you to configure the general iSCSI parameters.

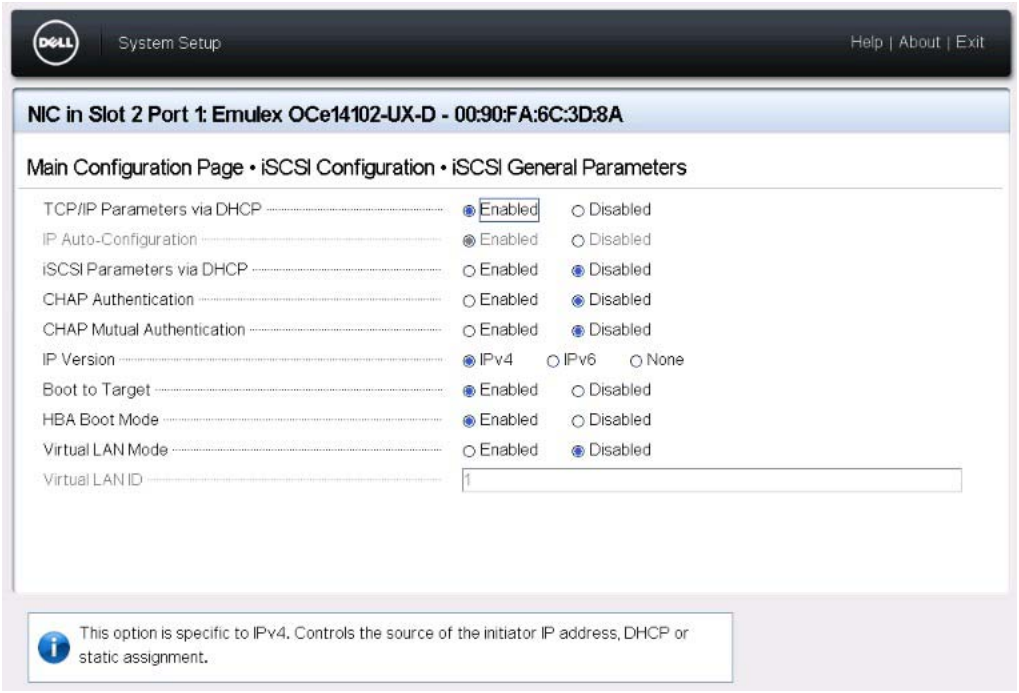

Figure F-8 iSCSI General Parameters Page

Table F-7 iSCSI General Parameters Page Menu Options

Menu Option	Description and Available Settings
TCP/IP Parameters via DHCP	Control the source of the initiator IP address: DHCP or static assignment. Available settings include: • Enabled • Disabled (default) **Note:** This option is specific to IPv4.
IP Auto-Configuration	Control the source of the initiator IP address: DHCP or static assignment. Available settings include: • Enabled • Disabled (default) **Note:** This option is specific to IPv6.
iSCSI Parameters via DHCP	Enable the acquisition of iSCSI target parameters from DHCP. Available settings include: • Enabled • Disabled (default)

Table F-7 iSCSI General Parameters Page Menu Options (Continued)

Menu Option	Description and Available Settings
CHAP Authentication	Enable the ability of the initiator to use CHAP authentication when connecting to the iSCSI target. Available settings include: • Enabled • Disabled (default)
CHAP Mutual Authentication	Setting to enable mutual CHAP authentication between the iSCSI initiator and target. To use mutual CHAP authentication, specify an initiator secret on the Initiator Parameters page and configure that secret on the target. Available settings include: • Enabled • Disabled (default)
IP Version	Control whether IPv4 or IPv6 network addressing is used for the iSCSI initiator. Available settings include: • IPv4 • IPv6 • None (default) – Dual mode
Boot to Target	Control whether the iSCSI initiator boots to the specified iSCSI target after connection. **Note:** This is only applicable to UEFI iSCSI boot. Available settings include: • Enabled • Disabled (default)
HBA Boot Mode	Control whether the iSCSI initiator will boot to the specified iSCSI target after connection. Available settings include: • Enabled (default) • Disabled
Virtual LAN Mode	Enable or disable iSCSI Virtual LAN mode, which allows a VLAN tag to be used by iSCSI boot. Available settings include: • Enabled • Disabled (default)
Virtual LAN ID	Specify the ID (tag) to be used for iSCSI VLAN Mode. The valid range for the VLAN ID is from 0 to 4095.

iSCSI Initiator Parameters Page

The iSCSI Initiator Parameters page (Figure F-9 on page 280) allows you to configure the iSCSI initiator parameters.

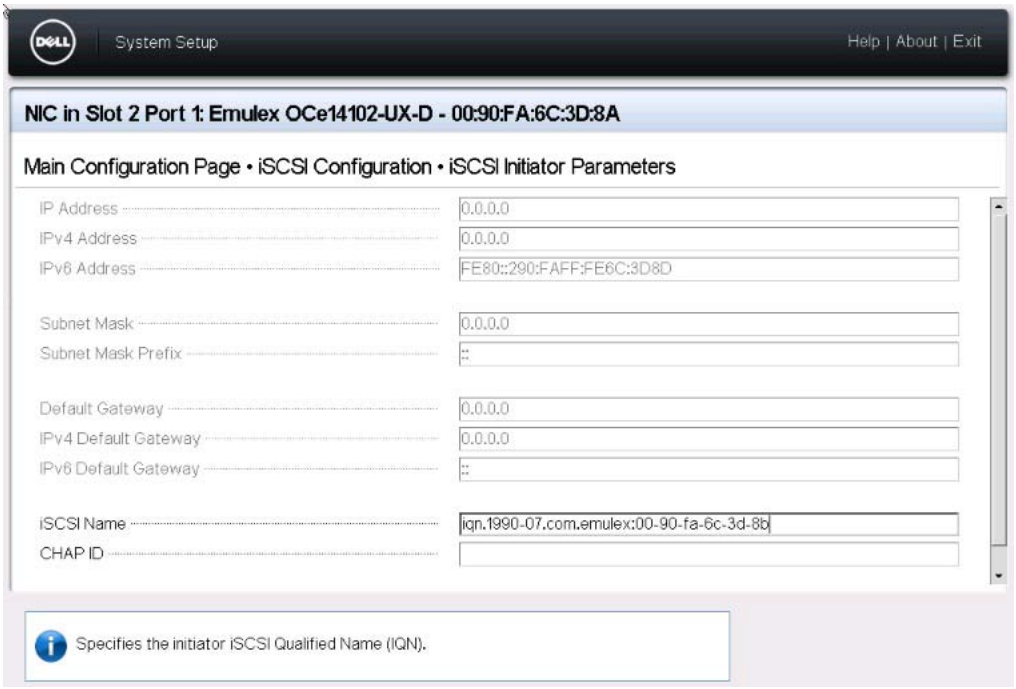

Figure F-9 iSCSI Initiator Parameters Page

Table F-8 iSCSI Initiator Parameters Page Menu Options

Menu Option	Description and Available Settings
IP Address	Specify the iSCSI initiator's IP address. The value should be in either IPv4 or IPv6 format and can be 2 to 39 characters long.
IPv4 Address	Specify the iSCSI initiator's IPv4 address. The value must be in IPv4 format and can be 7 to 15 characters long.
IPv6 Address	Specify the iSCSI initiator's IPv6 address. The value must be in IPv6 format and can be 2 to 39 characters long.
Subnet Mask	Specify the iSCSI initiator's IPv4 subnet mask. The value must be in IPv4 format and can be 7 to 15 characters long.
Subnet Mask Prefix	Specify the iSCSI initiator's IPv6 subnet mask. The value must be in IPv6 format and can be 2 to 39 characters long.
Default Gateway	Specify the iSCSI initiator's default gateway. The value should be in either IPv4 or IPv6 format and can be 2 to 39 characters long.
IPv4 Default Gateway	Specify the iSCSI initiator's IPv4 default gateway. The value must be in IPv4 format and can be 7 to 15 characters long.
IPv6 Default Gateway	Specify the iSCSI initiator's IPv6 default gateway The value must be in IPv6 format and can be 2 to 39 characters long.
iSCSI Name	Specify the initiator iSCSI Qualified Name (IQN). The valid range is 0 to 223 characters.

Table F-8 iSCSI Initiator Parameters Page Menu Options (Continued)

Menu Option	Description and Available Settings
CHAP ID	Specify the initiator CHAP ID. The valid range is 0 to 128 characters in length. If this can be set on a per target basis, then the first target value must be stored here.
CHAP Secret	Specify the ISCSI initiator's CHAP Secret. The valid range is 0 or 12 to 16 characters in length. If this can be set on a per target basis, the value for the first target must be stored here.

iSCSI First Target Parameters Page

The iSCSI First Target Parameters page (Figure F-10 on page 281) allows you to enable a connection for the first iSCSI target and configure parameters.

Figure F-10 iSCSI First Target Parameters Page

Table F-9 iSCSI First Target Parameters Page Menu Options

Menu Option	Description and Available Settings
Connect	Enable connecting to the first iSCSI target. Available settings include: • Enabled • Disabled (default)
IP Address	Specify the first target's IP address. The value should be in either IPv4 or IPv6 format and can be 2 to 39 characters long.
TCP Port	Specify the first target's TCP port number. The valid range is 1 to 65535.

Table F-9 iSCSI First Target Parameters Page Menu Options (Continued)

Menu Option	Description and Available Settings
Boot LUN	Specify the first iSCSI storage target's boot LUN. The valid range is 0 to 18446744073709551615.
iSCSI Name	Specify the first iSCSI storage target's initiator IQN. The valid range is 0 to 223 characters.
CHAP ID	Specify the first ISCSI storage target's CHAP ID. The valid range is 0 to 128 characters in length. If only a single value of the CHAP ID is supported, then it is stored here.
CHAP Secret	Specify the first ISCSI storage target's CHAP Secret. The valid range is 0 or 12 to 16 characters in length. If only a single value of the CHAP Secret is supported, then it is stored here.
IP Version	Control whether IPv4 or IPv6 network addressing is used for the first iSCSI target. Available settings include: • IPv4 (default) • IPv6

iSCSI Second Target Parameters Page

The iSCSI Second Target Parameters page (Figure F-11 on page 283) allows you to enable a connection for the second iSCSI target and configure parameters.

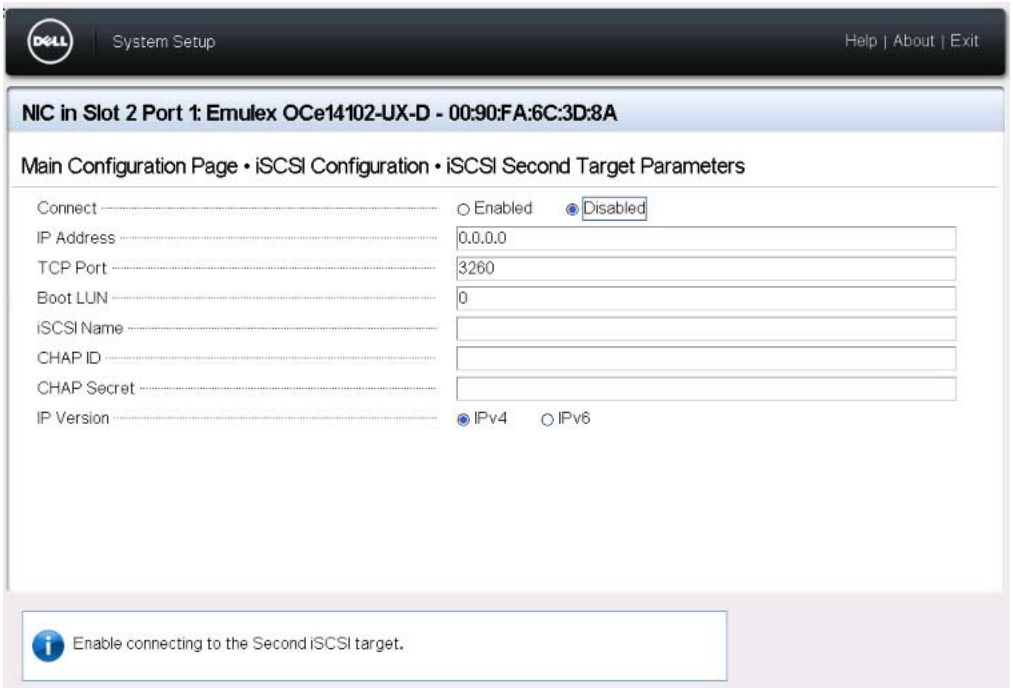

Figure F-11 iSCSI Second Target Parameters Page

Table F-10 iSCSI Second Target Parameters Page Menu Options

Menu Option	Description and Available Settings
Connect	Enable connecting to the second iSCSI target. Available settings include: • Enabled • Disabled (default)
IP Address	Specify the second target's IP address. The value should be in either IPv4 or IPv6 format and can be 2 to 39 characters long.
TCP Port	Specify the second target's TCP port number. The valid range is 1 to 65535.
Boot LUN	Specify the second iSCSI storage target's boot LUN. The valid range is 0 to 18446744073709551615.
iSCSI Name	Specify the second iSCSI storage target's initiator IQN. The valid range is 0 to 223 characters.
CHAP ID	Specify the second ISCSI storage target's CHAP ID. The valid range is 0 to 128 characters in length. If only a single value of the CHAP ID is supported for all targets, then it is stored here.
CHAP Secret	Specify the second ISCSI storage target's CHAP Secret. The valid range is 0 or 12 to 16 characters in length. If only a single value of the CHAP Secret is supported, then it is stored here.

Table F-10 iSCSI Second Target Parameters Page Menu Options (Continued)

Menu Option	Description and Available Settings
IP Version	Control whether IPv4 or IPv6 network addressing is used for the second iSCSI target. Available settings include: • IPv4 (default) • IPv6

iSCSI Secondary Device Parameters Page

The iSCSI Secondary Device Parameters page (Figure F-12 on page 284) allows you to configure the MAC address for a secondary iSCSI boot adapter.

System Setup
Help | About | Exit
NIC in Slot 2 Port 1: Emulex OCe14102-UX-D - 00:90:FA:6C:3D:8A
Main Configuration Page • iSCSI Configuration • iSCSI Secondary Device Parameters
Secondary Device MAC Address
00:00:00:00:00:00
Specifies the MAC address of a secondary iSCSI boot adapter for redundancy in case of boot failure.

Figure F-12 iSCSI Secondary Device Parameters Page

Table F-11 iSCSI Secondary Device Parameters Page Menu Options

Menu Option	Description and Available Settings
Secondary Device MAC Address	Configure the MAC address for a secondary iSCSI boot adapter in case of boot failure. The MAC address can have a maximum of 17 characters with a colon (:) separator between every two characters.

Device Level Configuration Page

The Device Level Configuration page (Figure F-13 on page 285) displays the global device level parameters and allows you to configure them.

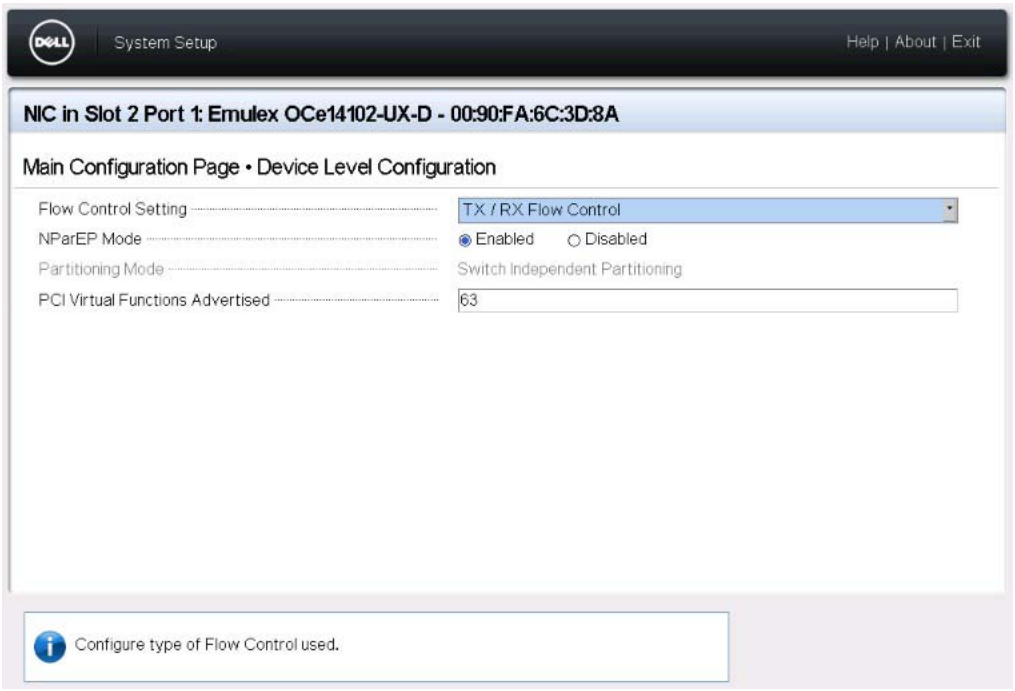

Figure F-13 Device Level Configuration Page

Table F-12 Device Level Configuration Page Menu Options

Menu Option	Description and Available Settings
Flow Control Setting	Configure the type of flow control used by the adapter. **Note:** Ethernet flow control cannot be changed if priority flow control is enabled on the switch ports and enabled in the firmware (through the OneCommand Manager application). Available settings include: • Auto • TX: Send Pause on RX Overflow • RX: Throttle TX on Pause Received • TX / RX Flow Control
NParEP Mode	Enable more than eight partitions on the device. It must not be enabled if the system and operating system do not support devices with more than eight PCI PFs. Available settings include: • Enabled • Disabled
Partitioning Mode	The current partitioning mode, which is always set to Switch Independent Partitioning.

Table F-12 Device Level Configuration Page Menu Options (Continued)

Menu Option	Description and Available Settings
PCI Virtual Functions Advertised	The number of PCI VFs to be advertised on this port in non-NPar mode. The valid range is 0 to 256. This value varies based on the adapter in use.

NIC Partitioning Configuration Page

The NIC Partitioning Configuration page (Figure F-14 on page 286) displays NIC partition information and allows you to configure their functionality.

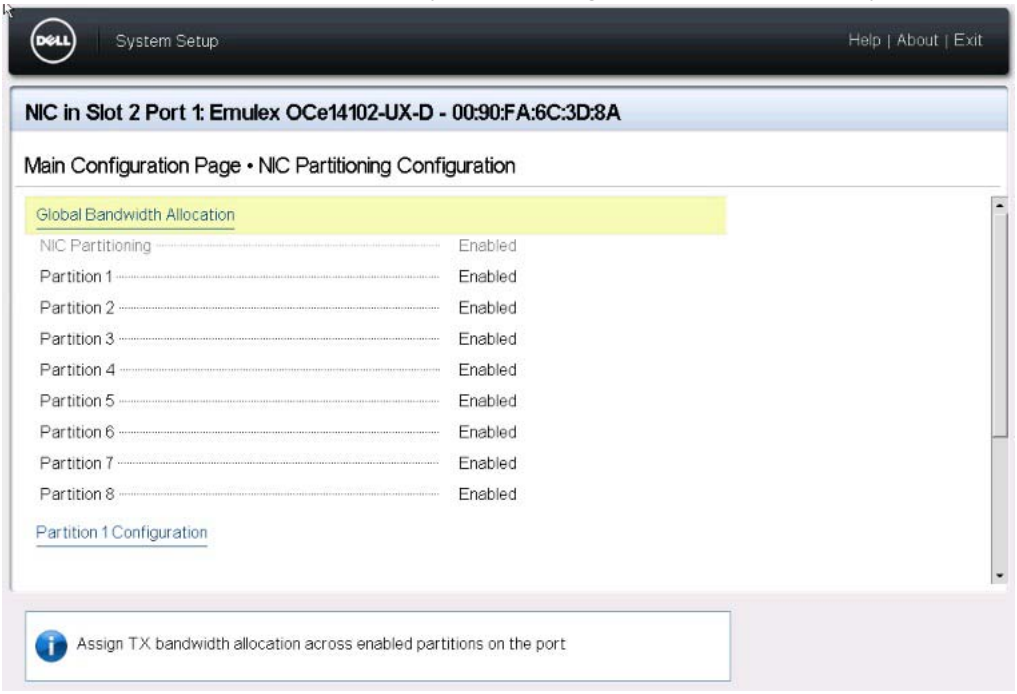
System Setup
Help | About | Exit
NIC in Slot 2 Port 1: Emulex OCe14102-UX-D - 00:90:FA:6C:3D:8A
Main Configuration Page • NIC Partitioning Configuration
Global Bandwidth Allocation
NIC Partitioning Enabled
Partition 1 Enabled
Partition 2 Enabled
Partition 3 Enabled
Partition 4 Enabled
Partition 5 Enabled
Partition 6 Enabled
Partition 7 Enabled
Partition 8 Enabled
Partition 1 Configuration
Assign TX bandwidth allocation across enabled partitions on the port

Figure F-14 NIC Partitioning Configuration Page

Table F-13 NIC Partitioning Configuration Page Menu Options

Menu Option	Description and Available Settings
Global Bandwidth Allocation	Assign TX bandwidth allocation across enabled partitions on the port. See “Global Bandwidth Allocation Page” on page 287 for more information.
NIC Partitioning	Indicate if NIC partitioning is enabled or disabled.
Partition n	View the current partition state. One listing for each partition is displayed with “n” representing the number of the partition.
Partition n Configuration	View the partition configuration. One listing for each partition is displayed with “n” representing the number of the partition. See “Partition Configuration Page” on page 288 for more information.

Global Bandwidth Allocation Page

The Global Bandwidth Allocation page (Figure F-15 on page 287) allows you to configure the TX bandwidth allocation across enabled partitions on the port.

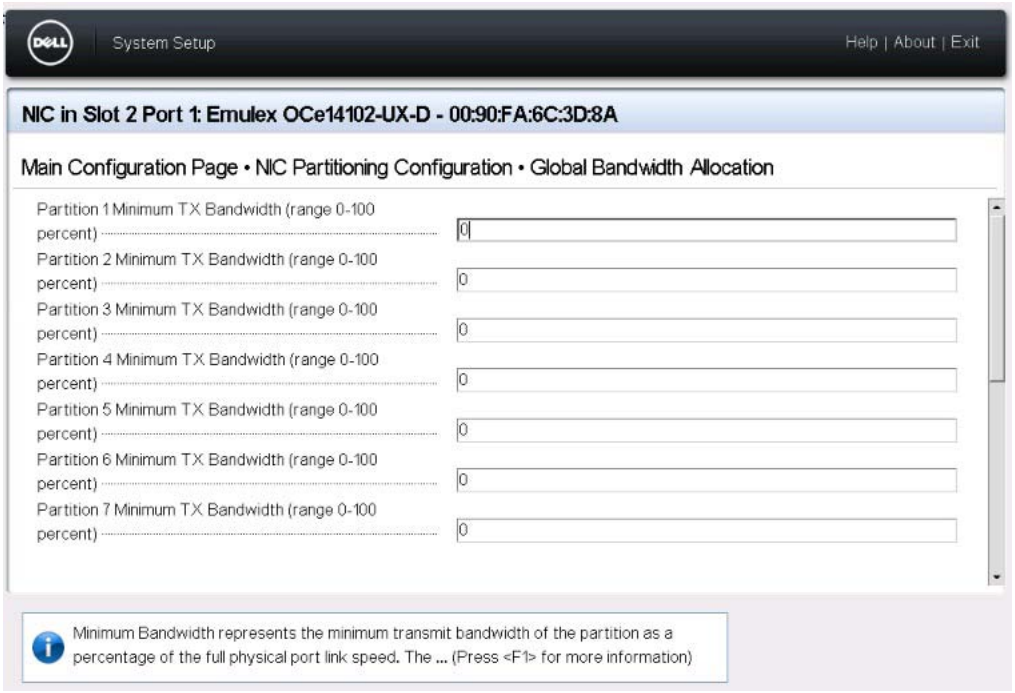
System Setup
Help | About | Exit
NIC in Slot 2 Port 1: Emulex OCe14102-UX-D - 00:90:FA:6C:3D:8A
Main Configuration Page • NIC Partitioning Configuration • Global Bandwidth Allocation
Partition 1 Minimum TX Bandwidth (range 0-100 percent)
Partition 2 Minimum TX Bandwidth (range 0-100 percent)
Partition 3 Minimum TX Bandwidth (range 0-100 percent)
Partition 4 Minimum TX Bandwidth (range 0-100 percent)
Partition 5 Minimum TX Bandwidth (range 0-100 percent)
Partition 6 Minimum TX Bandwidth (range 0-100 percent)
Partition 7 Minimum TX Bandwidth (range 0-100 percent)
0
Minimum Bandwidth represents the minimum transmit bandwidth of the partition as a percentage of the full physical port link speed. The ... (Press <F1> for more information)

Figure F-15 Global Bandwidth Allocation Page

Table F-14 Global Bandwidth Allocation Page Menu Options

Menu Option	Description and Available Settings
Partition n Minimum TX Bandwidth	The minimum transmit bandwidth value is the least amount of bandwidth that the partition can provide. It is represented as a percentage. One listing for each partition is displayed with “n” representing the number of the partition. The valid range is 0 to 100 percent for each enabled partition. The minimum transmit bandwidth value must be less than or equal to the maximum transmit bandwidth value. The total of the minimum transmit bandwidth values for all enabled functions on that port must be equal to 100. **Note:** A minimum transmit bandwidth value of 0 is a valid value. If all of the partitions’ minimum transmit bandwidth values are zero, the bandwidth is distributed equally among the current active partitions.
Partition n Maximum TX Bandwidth	The maximum transmit bandwidth value is the greatest amount of bandwidth that the function can provide. It is represented as a percentage. One listing for each partition is displayed with “n” representing the number of the partition. The valid range is 0 to 100 percent for each enabled partition.

Partition Configuration Page

The Partition Configuration page (Figure F-16 on page 288) displays information for a particular partition and allows you to configure some partition parameters. A separate page for each available partition is displayed.

Note: Only one storage function on each port is allowed. After a storage function is enabled on a partition, the storage protocols appear as unavailable on the other partitions.

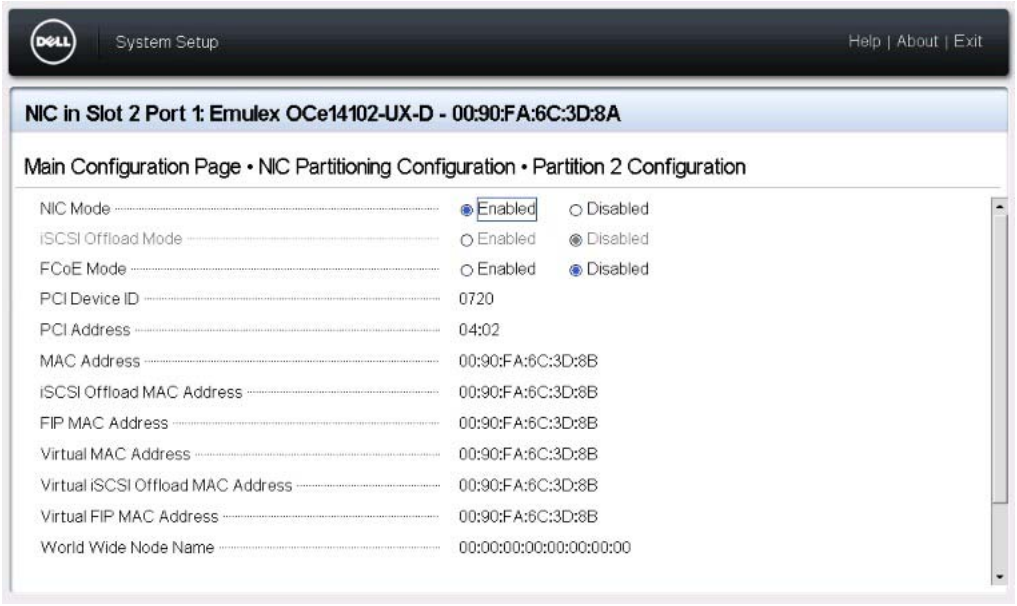

Figure F-16 Partition Configuration Page

Table F-15 Partition Configuration Page Menu Options

Menu Option	Description and Available Settings
NIC Mode	Enable or disable the NIC personality on the partition. Available settings include: • Enabled • Disabled The default setting is “Enabled” on all partitions. **Note:** The NIC Mode setting cannot be changed on Partition 1 of each port.
iSCSI Offload Mode	Enable or disable the iSCSI offload personality on the partition. Available settings include: • Enabled • Disabled (default)
FCoE Mode	Enable or disable the FCoE personality on the partition. Available settings include: • Enabled • Disabled (default)

Table F-15 Partition Configuration Page Menu Options (Continued)

Menu Option	Description and Available Settings
PCI Device ID	The PCI device ID for the partition.
PCI Address	The PCI address for the partition. This value is assigned by the system BIOS.
MAC Address	The permanent MAC address assigned at the factory.
iSCSI Offload MAC Address	The permanent MAC address for iSCSI offload assigned at the factory.
FIP MAC Address	The permanent FIP-MAC address for FCoE assigned at the factory.
Virtual MAC Address	A programmatically assignable MAC address for the partition.
Virtual iSCSI Offload MAC Address	Configure the MAC address for iSCSI offload. The setting can have a maximum of 17 characters with a colon (:) separator between every two characters.
Virtual FIP MAC Address	A programmatically assignable FIP-MAC address for the partition FCoE.
World Wide Node Name	The FC World Wide Node Name ID for FCoE. A maximum of 23 characters is supported. A colon separator (:) must be used between every two characters.
Virtual World Wide Node Name	Specify the FC World Wide Node Name ID for FCoE. A maximum of 23 characters is supported. A colon separator (:) must be used between every two characters.
World Wide Port Name	The FC World Wide Port Name ID for FCoE. A maximum of 23 characters is supported. A colon separator (:) must be used between every two characters.
Virtual World Wide Port Name	Specify the FC World Wide Port Name ID for FCoE. A maximum of 23 characters is supported. A colon separator (:) must be used between every two characters.

Appendix G. Configuring PXE Boot for NIC on Dell OCe14000-based Systems

This section describes how to use the PXESelect utility to set up a PXE bootable network by configuring a Dell OCe14000-based adapter.

Note: For Dell adapter models D6T93, F6PCP, JJPC0, and P3V42, PXE boot can be performed only on the first NIC partition on each port in the legacy x86 BIOS.

For more information on the PXE protocol, the PXE Boot process, and remotely installing with PXE on different operating systems, see chapter 3., "Configuring PXE Boot for NIC on OCe14000-series Adapters," on page 41.

Running the PXESelect Utility

To run the PXESelect utility, start or restart the computer. When prompted, hold down **<Ctrl>** and press **<P>**. If you are running the PXESelect utility with multiple adapters, all of the adapters are displayed when you start the utility. For example:

```
Press <Ctrl><P> for PXESelect(TM)Utility

Controller#0 Port#0 Base 0xFCE60000 at Bus:05 Dev:00 Fun:00
Controller#0 Port#1 Base 0xFCEA0000 at Bus:05 Dev:00 Fun:01
Controller#1 Port#0 Base 0xFC920000 at Bus:01 Dev:00 Fun:00
Controller#1 Port#1 Base 0xFC960000 at Bus:01 Dev:00 Fun:01
- Initializing ...Done.
```

The PXE Configuration menu appears after the boot BIOS initializes to begin the PXE configuration.

Note: A UEFI-capable system typically does not show the prompt for running the PXESelect utility unless it is configured for legacy booting. See your system configuration manual for information on performing a legacy boot. All configuration that can be performed in the PXESelect utility can instead be performed in the UEFI configuration utility. See appendix F., "Dell UEFI," on page 268 for more information.

Navigating the PXESelect Utility

Use the following methods to navigate the PXESelect utility:

- Press the up or down arrows on the keyboard to move through and select menu options or configuration fields. If multiple adapters are listed, use the up and down arrows to scroll to the additional adapters.
- Press the left or right arrows on the keyboard to move through and select setting options.
- Press **<Enter>** to accept a selection, select a menu option, or to change a configuration default.
- Press **<F7>** to save the changes on the screen.
- Press **<Esc>** to return to the previous menu or page, cancel a selection or dialog box, or exit the utility.

Setting Up a PXE Bootable Network

After the PXE boot BIOS is initialized, you can use the PXESelect utility to set up a PXE bootable network by configuring the adapters.

To configure adapters for PXE boot:

1. From the Controller List screen (Figure G-1 on page 291), use the up or down arrow keys to select the adapter you want to configure and press **<Enter>**.

Figure G-1 Controller List Screen

Note: The Controller List screen is displayed only if there are two or more adapters connected.

The Controller Configuration screen (Figure G-2 on page 291) is displayed.

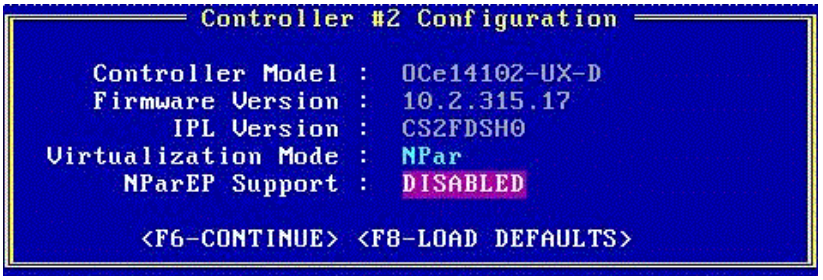

Figure G-2 Controller Configuration Screen

Depending on the adapter, one or more of the following items are displayed:

- Controller Name – displays the adapter's name.

- Firmware Version – displays the current firmware version.
- IPL Version – displays the IPL version.
- Virtualization Mode – select one of the following options:
  - NPar – if NPar is enabled, you can access up to eight virtual network interfaces (all partitions are set to NIC by default). For additional information on NPar support, see "Configuring NPar" on page 293.
  - SRIOV – if the system BIOS supports SR-IOV, you can enable it if NPar support is disabled. For more information on SR-IOV configuration, see the appropriate Emulex driver manual.
  - None – if there is no virtualization mode selected, there is only one NIC function on each port and there are no storage functions.

  Note: If the virtualization mode has changed since the last boot, a reboot will occur when you exit the PXESelect utility.

- NParEP Support – if NParEP support is enabled, each port can be partitioned into isolated PFs (channels) up to total of 16 functions. See "Enabling NParEP Support" on page 295 for more information.

  Note: NParEP support is only available on Dell 13G or newer systems.

2. After you have set the options in the Controller Configuration screen (Figure G-2 on page 291), press **<F7>** to save the current settings.
3. Press **<F6>** to proceed.

   Note: If you want to erase the current configuration, press **<F8>**. See "Erasing Ports and Adapter Configurations" on page 300 for more information.

   The Port Selection Menu screen (Figure G-3 on page 292) is displayed.

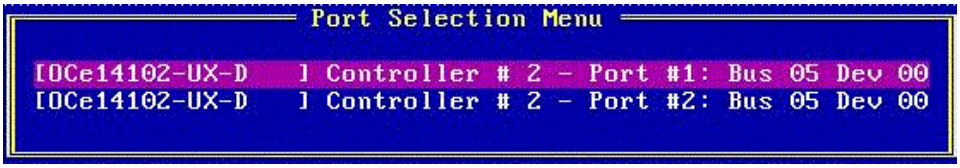

Figure G-3 Port Selection Menu Screen

   Note: The Port Selection Menu screen is displayed only if there are two or more ports connected.

4. Select the port you want to configure and press **<Enter>**. The Port Menu screen (Figure G-4 on page 293) is displayed.
5. From the Port Menu screen, you can select one of the following options:
   - NPar Configuration – see "Configuring NPar" on page 293 for additional information.
   - Boot Configuration – see "Configuring Boot Options" on page 296 for additional information.
   - Port Configuration – see "Configuring Port Options" on page 298 for additional information.

Select the desired configuration option and press **<Enter>**.

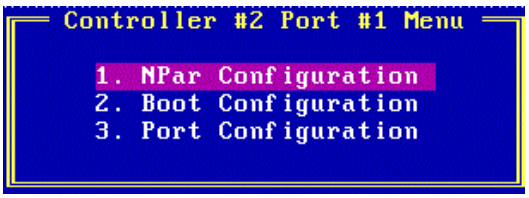

Figure G-4 Port Menu Screen

Configuring NPar

NPar support provides the ability to configure multiple physical functions or I/O partitions for each physical adapter port.

Notes

- The settings in this menu can be configured only if the virtualization mode is set to "NPar". Otherwise, the settings in this menu are for viewing purposes only.
- If NPar support is enabled, you must configure the NPar settings (minimum and maximum bandwidths) for iSCSI and FCoE storage functions in the NIC BIOS before they can be configured further from their respective utilities (iSCSI or FCoE BIOS). Otherwise, the Logical Link for that function will still show as down, and you will not be able to log into targets or find LUNs behind those targets.

To configure NPar:

1. From Port Menu screen (Figure G-4 on page 293), select **NPar Configuration** and press **<Enter>**. The Partition List screen (Figure G-5 on page 293) is displayed.

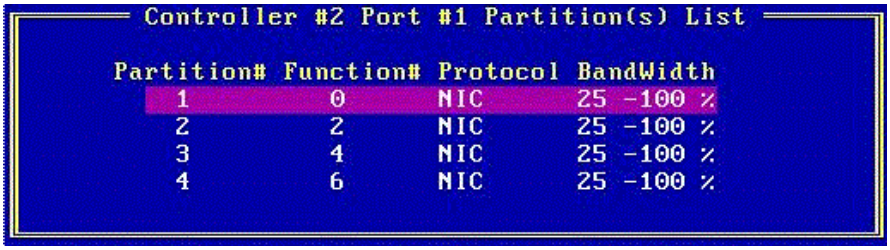
Controller #2 Port #1 Partition(s) List
Partition# Function# Protocol BandWidth
1 0 NIC 25 -100 %
2 2 NIC 25 -100 %
3 4 NIC 25 -100 %
4 6 NIC 25 -100 %

Figure G-5 Partition(s) List Screen

2. Select the partition you want to configure and press **<Enter>**. The Configure Partition screen (Figure G-6 on page 293) is displayed.

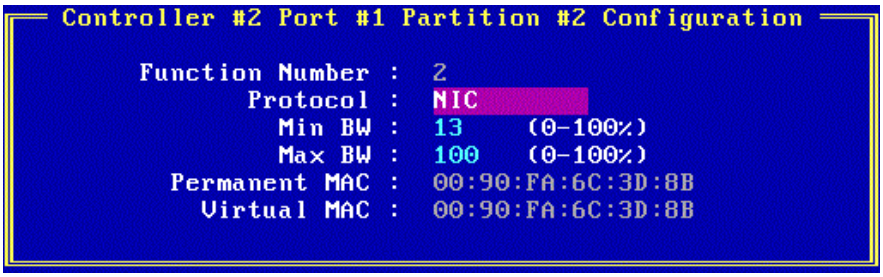
Controller #2 Port #1 Partition #2 Configuration
Function Number : 2
Protocol : NIC
Min BW : 13 (0-100%)
Max BW : 100 (0-100%)
Permanent MAC : 00:90:FA:6C:3D:8B
Virtual MAC : 00:90:FA:6C:3D:8B

Figure G-6 Configure Partition Screen

3. From the Configure Partition screen, you can perform the following tasks:
   - View the function number.
   - Select the protocol for each function, except for PF #0 and PF #1.
   - Configure the minimum and maximum bandwidth for each channel
   - View the permanent and virtual MAC addresses.

Selecting the Protocol

This option specifies a list of available protocols that can be configured on an adapter. Depending on the protocols for which the adapter is licensed, one or more of the following selections is displayed:

- NIC – implies that all the enabled functions provide NIC functionality
- iSCSI or FCoE – these protocols are enabled on one function per adapter port and include NIC functionality on the other enabled functions

  ### Notes

  - Only one of each storage protocol is allowed on each port.
  - Two iSCSI functions and two FCoE functions are not allowed on a single port.
- None – allows you to disable that particular function (0–7).

The menu displays the available personalities only, including both free and licensed personalities.

To select the protocol:

1. From the Configure Partition screen (Figure G-6 on page 293), use the left or right arrow keys to select the desired protocol.
   - NIC
   - iSCSI
   - FCoE
   - None
2. Press **<F7>** to save.

   Note: If the protocol selection has changed since the last boot, a reboot will occur when you exit the PXESelect utility.

Configuring Minimum and Maximum Bandwidth

To configure bandwidth:

1. On the Configure Partition screen (Figure G-6 on page 293), use the use the up or down arrow keys to select **Min BW** or **Max BW**.
2. Use the left or right arrow keys to select the desired bandwidth value.
   - The Minimum Bandwidth value is the least amount of bandwidth that the function can provide. It is represented as a percentage. The Minimum Bandwidth value must be less than or equal to the Maximum Bandwidth value.

The total of the Minimum Bandwidth values for all enabled functions on that port must be equal to 100.

Note: A Minimum Bandwidth value of 0 is a valid value. If all of the partitions' Minimum Bandwidth values are zero, the bandwidth is distributed equally among the current active partitions.

- The Maximum Bandwidth is the greatest amount of bandwidth that the function can provide. It is represented as a percentage.

3. Press **<F7>** to save.

Enabling NParEP Support

Note: NParEP support is available only on Dell 13G or newer systems.

NParEP support provides the ability to configure additional PCI functions or I/O partitions for each physical adapter port if NPar is enabled.

You can configure up to 16 functions on a one-port OCe14400-series adapter, up to 8 functions per port on a one or two-port OCe14100-series adapter, and up to 4 functions per port on a four-port OCe14100-series adapter.

The maximum number of functions allowed on an adapter is controlled by the adapter's IPL file and the system's support for NParEP.

The following requirements must be met in order to support more than eight functions on an adapter.

- The Dell system hardware (the motherboard and BIOS) must support NParEP.
- The host operating system must support NParEP:
  - Windows Server 2012 and newer versions
  - RHEL 5.9 and newer versions
  - RHEL 6.4 and newer versions
  - SLES 11 SP2 and newer versions
  - ESXi 5.0 and newer versions
- The application management tools, including the OneCommand Manager application, must support NParEP.
- NParEP must be enabled in the firmware using the OneCommand Manager application.

If these conditions are not met, you may be able to configure more than eight functions, but only up to eight functions will be running and discovered after a reboot.

To enable NParEP:

1. From Controller Configuration screen (Figure G-2 on page 291), select NParEP Support.
2. Select **Enabled** and press **<F7>** to save.

If NParEp is enabled, additional functions are displayed on the Partition List screen (Figure G-7 on page 296).

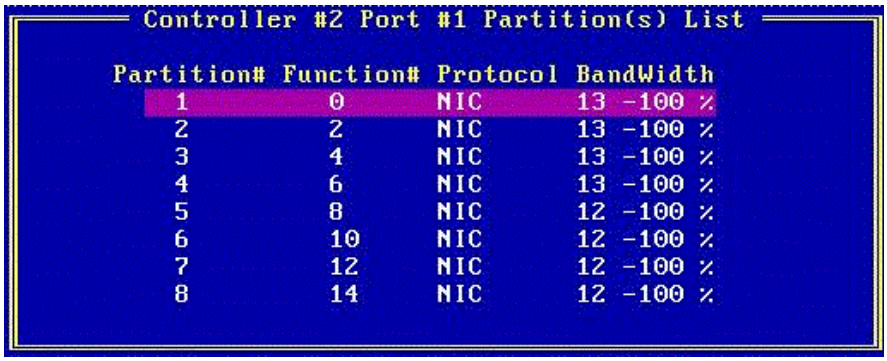
Controller #2 Port #1 Partition(s) List
Partition# Function# Protocol BandWidth
1 0 NIC 13 -100 %
2 2 NIC 13 -100 %
3 4 NIC 13 -100 %
4 6 NIC 13 -100 %
5 8 NIC 12 -100 %
6 10 NIC 12 -100 %
7 12 NIC 12 -100 %
8 14 NIC 12 -100 %

Figure G-7 Partition(s) List Screen (NParEP Enabled)

See "Configuring NPar" on page 293 for more information on configuring the additional functions.

Configuring Boot Options

To view the Boot Configuration screen:

1. From the Port Menu screen (Figure G-4 on page 293), select **Boot Configuration** and press **<Enter>**. The Boot Configuration screen (Figure G-8 on page 296) is displayed.

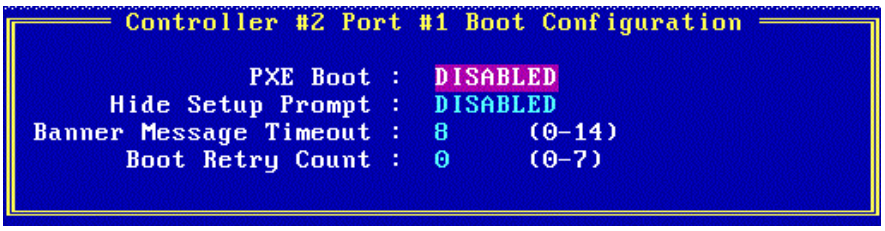
Controller #2 Port #1 Boot Configuration
PXE Boot : DISABLED
Hide Setup Prompt : DISABLED
Banner Message Timeout : 8 (0-14)
Boot Retry Count : 0 (0-7)

Figure G-8 Boot Configuration Screen

From the Boot Configuration screen, you can perform the following tasks:

- Configure PXE boot support – see "Configuring PXE Boot Support" on page 297 for instructions.
- Configure the Hide Setup prompt – see "Configuring the Hide Setup Prompt" on page 297 for instructions.
- Configure the banner message timeout – see "Configuring the Banner Message Timeout" on page 297 for instructions.
- Configure the boot retry count – see "Configuring the Boot Retry Count" on page 297 for instructions.

Configuring PXE Boot Support

To configure PXE boot support:

1. On the Boot Configuration screen (Figure G-8 on page 296), use the left or right arrow keys to enable or disable the PXE Boot setting.
2. Press **<F7>** to save.

Note: If PXE boot is enabled, during system startup PXE contacts the DHCP server for an IP address to boot from the network.

Configuring the Hide Setup Prompt

This setting enables or disables the CTRL<P> setup prompt (banner) during POST.

To configure the Hide Setup prompt:

1. On the Boot Configuration screen (Figure G-8 on page 296), use the left or right arrow keys to enable or disable the Hide Setup Prompt setting.
2. Press **<F7>** to save.

Configuring the Banner Message Timeout

This setting controls the number of seconds that the PXE banner message is displayed during POST. The valid range is 0 to 14.

To configure the banner message timeout:

1. On the Boot Configuration screen (Figure G-8 on page 296), use the left or right arrow keys to select the desired amount of time (in seconds) for the Banner Message Timeout setting.
2. Press **<F7>** to save.

Configuring the Boot Retry Count

This setting specifies the number of boot retry attempts before control is returned to the system BIOS. Valid values include:

- 0 (no retry)
- 1 to 7

To configure the boot retry count:

1. On the Boot Configuration screen (Figure G-8 on page 296), use the left or right arrow keys to select the desired number of retries for the Boot Retry Count setting.
2. Press **<F7>** to save.

Configuring Port Options

To view the Port Configuration screen:

1. From the Port Menu screen (Figure G-4 on page 293), select **Port Configuration** and press **<Enter>**. The Port Configuration screen (Figure G-9 on page 298) is displayed.

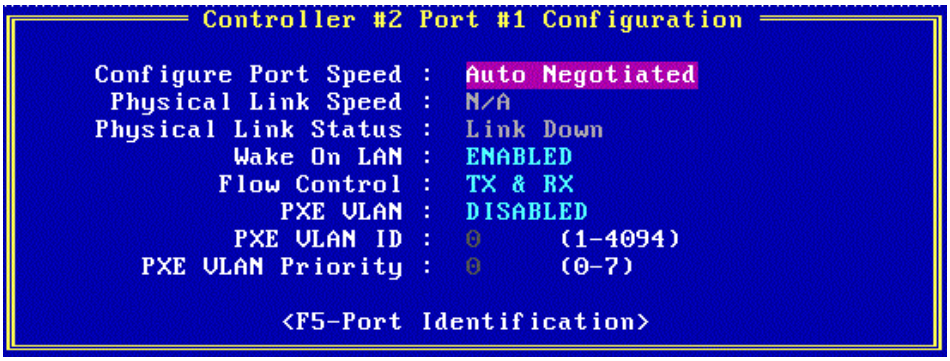

Figure G-9 Port Configuration Screen

2. From the Port Configuration screen, you can perform the following tasks:
   - Set the configured port speed – see "Setting the Configured Port Speed" on page 298 for instructions.
   - View the physical link speed and link status.
   - Configure WoL – see "Configuring Wake on LAN" on page 298 for instructions.
   - Configure flow control – see "Configuring Flow Control" on page 299 for instructions.
   - Configure PXE VLAN, including the PXE VLAN ID and priority – see "Configuring the PXE VLAN ID and Priority" on page 299 for instructions.
   - Identify the port – see "Physically Identifying the Port" on page 299 for instructions.

Setting the Configured Port Speed

To set the port speed:

1. On the Port Configuration screen (Figure G-9 on page 298), use the left or right arrow keys to select **Auto Negotiated**, **10G**, or **1G** for the Configured Port Speed setting.
2. Press **<F7>** to save.

Configuring Wake on LAN

To configure Wake on LAN:

1. From the Port Configuration screen (Figure G-9 on page 298), use the left or right arrow keys to enable or disable the Wake on LAN setting.
2. Press **<F7>** to save.

Configuring Flow Control

This setting allows you to configure the type of flow control used by the adapter.

Note: Ethernet flow control cannot be changed if priority flow control is enabled on the switch ports and enabled in the firmware (through the OneCommand Manager application).

To configure flow control:

1. From the Port Configuration screen (Figure G-9 on page 298), use the left or right arrow keys to select one of the following settings for the Flow Control setting.
   - TX & RX
   - TX (Send Pause on RX Overflow)
   - RX (Throttle TX on Pause Received)
   - Disabled
2. Press **<F7>** to save.

Configuring the PXE VLAN ID and Priority

To configure a PXE VLAN ID and set the priority level:

1. On the Port Configuration screen (Figure G-9 on page 298), use the left or right arrow keys to enable the PXE LAN setting.
2. For the PXE VLAN ID, use the left or right arrow keys to enter a number from 1 to 4094.
3. For the PXE VLAN Priority level, use the left or right arrow keys to enter a number from 0 to 7.

   This unique value assigns a priority to outbound packets containing a specified VLAN ID. Valid values range from 0 to 7, with 0 the highest priority level.
4. Press **<F7>** to save.

After you exit the PXESelect utility, the system will reboot for the configuration to take effect.

Physically Identifying the Port

To physically determine which port you are configuring by causing the link and activity LEDs of that port to blink:

1. On the Port Configuration screen (Figure G-9 on page 298), press **<F5>**.
2. The LEDs on the adapter begin blinking. The selected port's LED status indicators blink on the adapter for approximately 15 seconds.

Note: Not all adapters have LEDs that are visible externally. If you are using an add-in card in a blade server environment, the port identification or beaconing capability does not work.

Erasing Ports and Adapter Configurations

Note: If this setting is selected, all previous configuration settings are returned to their factory default settings including the current protocol selection. Emulex recommends performing this action to provide a clean environment for new configuration settings to take effect.

To erase the ports and adapter configuration:

1. On the Controller Configuration screen (Figure G-2 on page 291), press **<F8>** to restore the factory default settings. A warning is displayed asking if you want to erase the current configuration for all ports of the adapter.
2. Press **<Y>** to delete the configuration. You will receive another warning asking you to confirm the permanent removal of the configuration.
3. Press **<Y>** to delete the configuration.

To exit the PXESelect utility after erasing the ports and adapter configuration:

1. Follow the instructions on the bottom of the individual menu screens until you are prompted to exit.
2. Press **<Y>** to exit. Depending on what settings were changed, a reboot may be necessary.

   Note: For older systems, depending on the memory allocation method supported, the PXESelect utility automatically reboots even if no changes were made to the system.

PXE Boot Parameters Default Values

The default settings for the PXE Boot parameters are listed in the following table.

Table G-1 PXE Boot Parameter Default Values

Parameter	Default Value	Valid Values
Hide Setup Prompt	Disabled	Enabled Disabled
Banner Message Timeout	8	0–14
Port Speed	Auto Negotiated	Auto Negotiated 10G 1G
PXE Boot	Disabled **Note:** On some Dell LOMs, this setting is enabled by default on port 1.	Enabled Disabled
Boot Retry Count	0	0 (no retry) 1–7 Retries

Table G-1 PXE Boot Parameter Default Values (Continued)

Parameter	Default Value	Valid Values
Wake on LAN	Enabled	Enabled Disabled
Flow Control	TX & RX	TX & RX TX RX Disabled
PXE VLAN	Disabled	Enabled Disabled
PXE VLAN ID	0	1–4094
PXE VLAN Priority	0	0–7
Virtualization Mode	None	NPar SRIOV None
NParEP Support	Disabled	Enabled Disabled
Protocol	NIC	NIC FCoE iSCSI Disabled
Min BW	25%	The total bandwidth is distributed evenly across all the enabled partitions.
Max BW	100%	From the minimum bandwidth value up to 100% (inclusive).